UNITED STATES MARINE CORPS
Marine Corps Base
Camp Lejeune, North Carolina 28542-5001

File
Energy Conservation Investment Program (ECIP)

P-799
PWO

09 MAY 1986

From: Commanding General, Marine Corps Base, Camp Lejeune
To: Commandant of the Marine Corps (LFF-1)
Via: (1) Commander, Atlantic Division, Naval Facilities Engineering Command, Norfolk, VA 23511-6287
(2) Commander, Naval Facilities Engineering Command, 200 Stovall Street, Alexandria, VA 22332-2300

Subj: FY-87 ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP), PROJECT P-799, ADD INSULATION TO ABOVE-GROUND STEAM LINES; SUBMISSION OF

Ref: (a) MCO P11000.12C

Encl: (1) Project package consisting of DD Form 1391/1391c, Life Cycle Cost Analysis Summary, and approved NAVMC Form 11069 with Site Location Map, dtd 14 Apr 86

1. The reference provided detailed guidance in the preparation of ECIP project documentation. Accordingly, the enclosure is submitted for your review and continuing action.

2. The Atlantic Division, Naval Facilities Engineering Command is requested to certify the cost of the subject project to the Commander, Naval Facilities Engineering Command, with copies to CMC and this Command.

3. If there are any questions, please contact Mr. E. G. Jones, Jr. on AV 484-1833.

R. A. TIEBOUT
By direction

Copy to:
CMC (LFF-1) (advance
NAVFACENGCOM (advance)
CO, MCAS NR (S-4)

1. COMPONENT	FY 19 87 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
MARINE CORPS		14 Apr 86

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA 28542	ADD INSULATION TO ABOVE-GROUND STEAM LINES

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST ($000)
	882-22	P-799	1,014

9. COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT COST	COST ($000)
ADD INSULATION TO STEAM LINES	LF	41,400	21.10	874
CONTINGENCIES - 10%	LS	-	-	87
ESTIMATED CONTRACT COST	LS	-	-	961
SUPERVISION, INSPECTION & OVERHEAD 5.5%	LS	-	-	53
TOTAL FUNDS REQUESTED	LS	-	-	1,014
INSTALLED EQUIPMENT - OTHER APPROPRIATIONS	-	-	-	

10. DESCRIPTION OF PROPOSED CONSTRUCTION

Install additional insulation and cover on 41,400 feet of above ground steam lines.

11. REQUIREMENTS:

PROJECT: Add additional insulation and cover on above-ground steam lines at Camp Johnson and MCAS New River.
REQUIREMENT: To reduce energy waste by eliminating heat loss through existing insulation.
CURRENT SITUATION: There is insufficient insulation of 41,400 feet of above-ground steam lines.
IMPACT IF NOT PROVIDED: Continued energy waste due to heat loss through insufficiently insulated steam lines.

1. COMPONENT	FY 19 87 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
MARINE CORPS		14 Apr 86

3. INSTALLATION AND LOCATION
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542

4. PROJECT TITLE	5. PROJECT NUMBER
ADD INSULATION TO ABOVE-GROUND STEAM LINES	P-799

SPECIAL CONSIDERATIONS

1. POLLUTION PREVENTION, ABATEMENT, AND CONTROL: This project will not cause additional air or water pollution.

2. FLOOD HAZARD EVALUATION: Not applicable.

3. ENVIRONMENTAL IMPACT: The project Environmental Impact Assessment has been made, reviewed, and where required, the design concepts give consideration to eliminating adverse environmental effects consistent with applicable directives.

4. FALLOUT SHELTER CONSTRUCTION: Not applicable.

5. DESIGN FOR ACCESSIBILITY OF PHYSICALLY HANDICAPPED PERSONNEL: Not applicable.

6. USE OF AIR CONDITIONING: Not applicable.

7. PRESERVATION OF HISTORICAL SITES AND STRUCTURES; Not applicable.

8. "NEW START" CRITERIA FOR COMMERCIAL OR INDUSTRIAL ACTIVITIES PROGRAM (OMB CIRCULAR A-76): Not applicable.

1. COMPONENT	FY 19 87 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
MARINE CORPS		14 Apr 86

3. INSTALLATION AND LOCATION

MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542

4. PROJECT TITLE	5. PROJECT NUMBER
ADD INSULATION TO ABOVE-GROUND STEAM LINES	P-799

FACILITY STUDY

1. Project: Add insulation to 41,400 feet of above-ground steam lines at Montford Point, and MCAS New River. The existing insulation varies from bare pipe to 3 inches. This project will increase all insulation in these areas to 4 inches or more.

a. Site Locations:

(1) Montford Point Area. Various sized above-ground steam lines in this area for a total of 21,885 linear feet.

(2) MCAS, New River. Various sized above-ground steam lines in this area for a total of 19,595 linear feet.

2. Current and Planned Future Workload with Regard to this Project: These facilities and their demands for energy are expected to continue as a necessary requirement through the life of the project.

3. Description of Proposed Construction:

a. Type of Construction. Insulation with outer aluminum cover.

b. Description of Work to be Done:

(1) Primary Facility. Add insulation to 41,400 linear feet of above-ground steam lines.

(2) Energy Conservation. This project will save 23,996 MBTU`s of energy each year.

(3) Collateral Equipment. Not applicable.

(4) Supporting Facilities. Not applicable.

4. Cost Estimate. Area cost factor for Camp Lejeune, NC is 0.86, from the Military Construction Cost Review Guide, FY-82 (DOD 4270 1-CG). The book date is escalated to FY-86 to provide cost for this project.

1. COMPONENT	FY 19 87 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
MARINE CORPS		14 Apr 86

3. INSTALLATION AND LOCATION

MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542

4. PROJECT TITLE	5. PROJECT NUMBER
ADD INSULATION TO ABOVE-GROUND STEAM LINES	P-799

a. Justification for Project:

(1) Project. The proposed project will provide energy conservation in the form of steam reduction.

(2) Requirement. Executive Order 12003 of July 1977 established government-wide energy conservation goals that require a 20% reduction in average annual energy consumption by 1985. Energy shortages and substantially increased costs for energy have also made energy conservation a necessity.

(3) Current Situation. The existing insulation is insufficient and needs to be increased to 4 inches or more.

(4) Impact if Not Provided. Continued energy losses due to heat loss from steam lines.

b. Justification for Scope of Project. In order to have a significant effect on Base steam consumption, sufficient insulation must be installed on steam lines.

6. Equipment Provided from Other Appropriations. Not applicable.

7. Common Support Facilities. Not applicable.

8. Siting of the Project. See paragraph 1a and enclosure (1).

9. Effect on Other Resources. Not applicable.

10. Other Graphic Presentations, including Photographs: None.

11. Economic Analysis. See enclosure (2).

12. Quantitative Data: Not applicable.

REQUEST FOR PROJECT SITE APPROVAL
NAVMC 11069 (11-80)
SN: 0000-00-006-7880 U/I: PADS OF 50

PROJECT NUMBER	ACTIVITY UIC
P-799	67001

TO: COMMANDANT OF THE MARINE CORPS (CODE LFE-1) (4700)

SECTION A FOR USE BY REQUESTER

FROM
Marine Corps Base, Camp Lejeune, North Carolina 28542

CATEGORY CODE AND PROJECT TITLE	TYPE OF FUNDING	COST ($000)	PROGRAM YEAR
882-22 Add-Insulation to Above Ground Steam Lines	MCON	1,014	FY-87

PROJECT DESCRIPTION
Install additional insulation and cover on 41,400 feet of above ground steam lines.

REMARKS
This is an FY-87 Energy Conservation Investment Program (ECIP) project.

TYPE OF MAP	DATE
Site Location (encl 1)	-

REQUESTED BY *(Typed name and signature)*
E. G. JONES, Jr.

DATE
21 Apr 86

SECTION B HQMC REVIEW AND ANALYSIS

ANALYSIS
(Place a check (✓) in box opposite each item. Y = Yes; N = No; NA = Not Applicable)

DATE RECEIVED

Y	N	NA	PROJECT SITING CONSIDERATION
✓			a. COMPATIBLE WITH ACTIVITY PLANNED DEVELOPMENT GOALS
✓			b. DEMONSTRATES SOUND PLANNING PRINCIPLES
✓			c. MEETS MINIMUM PLANNING AND SITING CRITERIA
			d. COMPLIES WITH THE FOLLOWING CRITERIA:
		NA	(1) AMMUNITION AND EXPLOSIVES
		NA	(2) ELECTROMAGNETIC RADIATION
		NA	(3) AIRFIELD SAFETY
		NA	(4) NOISE INTENSITY
		NA	(5) FIRE PROTECTION

COMPATIBLE WITH ACTIVITY MASTER PLAN *(Check appropriate box)*
- ☐ IDENTICAL
- ☐ DIFFERENT BUT CONSISTENT
- ☐ NOT SHOWN BUT CONSISTENT
- ☐ *NOT SHOWN AND INCONSISTENT
- ☐ *DIFFERENT AND INCONSISTENT

CRITERIA CERTIFICATION(S) REQUESTED *(Check)*
☐ DDESB ☐ CNO ☐ NAVSEA ☐ NAVELEX ☐ NAVAIR ☐ OTHER:

DATE

DATE CERTIFICATION(S) RECEIVED

DDESB	CNO	NAVSEA	NAVELEX	NAVAIR	OTHER

ACTION
☐ APPROVED ☐ DISAPPROVED ☐ DEFERRED

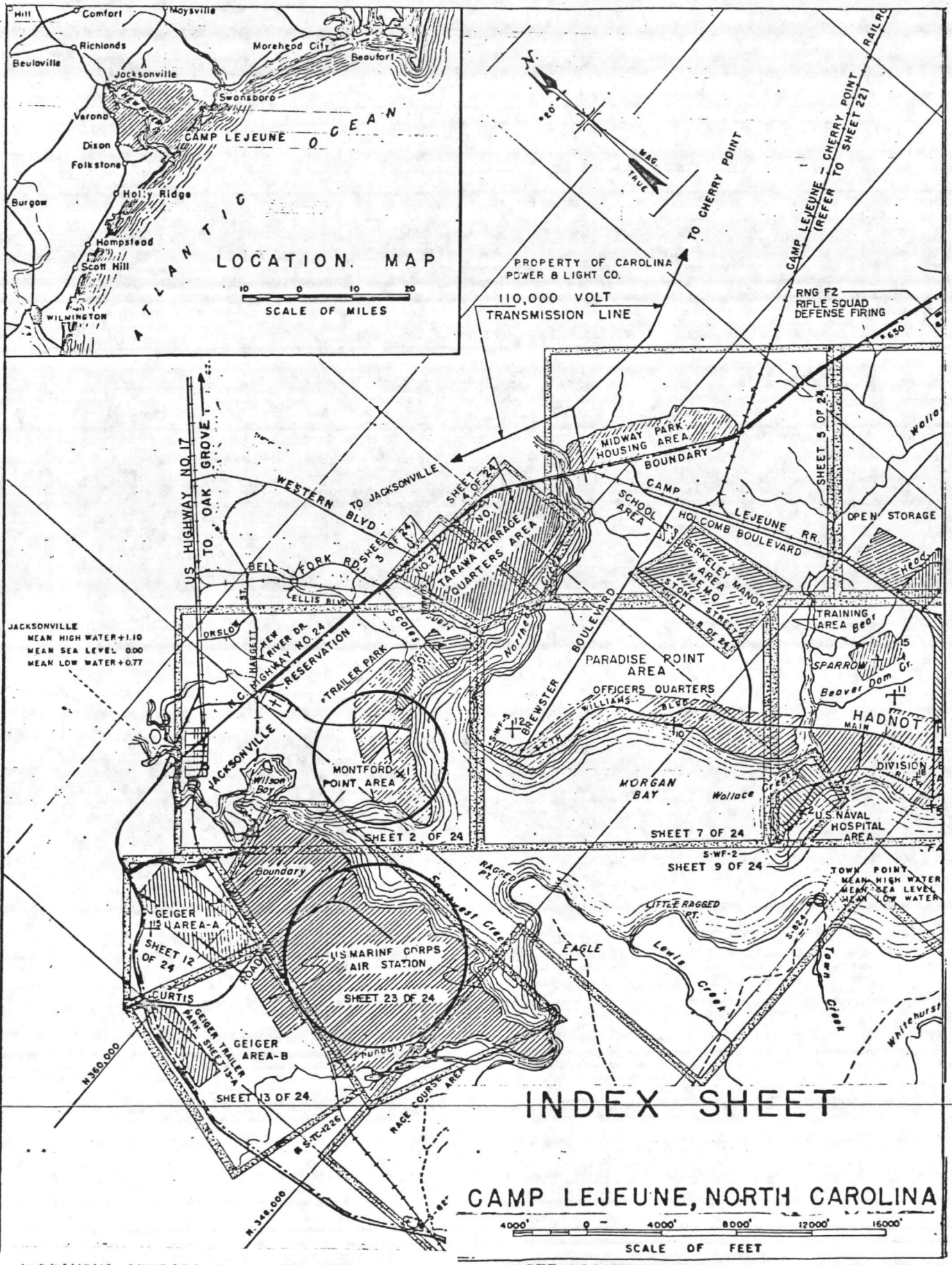
REMARKS
Site approved by Base Commander under MCO P11000.12C.

APPROVING OFFICIAL *(Typed name and signature)*
R. A. TIEBOUT, By direction

DATE
28 APR 1986

*Requires approval of a major change to the master plan prior to site approval.

ENCL (1)



APPROVING OFFICIAL Date: 28 APR 1986

R. A. TIEBOUT, By direction

SITE LOCATION MAP P-799

ADD INSULATION TO ABOVE GROUND STEAM LINES

Encl (1)

LIFE CYCLE COST ANALYSIS SUMMARY 1625/Util
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: CAMP LEJEUNE, NC REGION NO: 4

PROJECT TITLE: INSULATE ABOVE GROUND STEAM LINES FISCAL YEAR 87

DISCRETE PORTION NAME:

ANALYSIS DATE: ECONOMIC LIFE 25 YEARS

1. INVESTMENT

A.	CONSTRUCTION COST	$ 747,355
B.	SIOH	$ 41,105
C.	DESIGN COST	$ 44,841
D.	ENERGY CREDIT CALC (1A+1B+1C)X.9	$ 749,971
E.	SALVAGE VALUE OF EXISTING EQUIPMENT	-$ 0
F.	TOTAL INVESTMENT (1D-1E)	$ 749,971

2. ENERGY SAVINGS (+)/COST (-)
ANALYSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS

FUEL	COST $/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL $ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVING(5)
A. ELECT	$		$		$
B. DIST	$ 7.69	2,324	$ 17,872	16.64	$ 297,383
C. RESID	$ 5.49	21,672	$ 118,979	16.54	$ 1,967,917
D. NG	$		$		$
E. CO/DIST	$		$		$
F. TOTAL		23,996	$ 136,851		-------> $2,265,300

3. NON ENERGY SAVING (+)/COST (-)

A.	ANNUAL RECURRING (+/-)	$ 0
	(1) DISCOUNT FACTOR (TABLE A)	
	(2) DISCOUNTED SAVING/COST (3A X 3A1)	$ 0

B. NON RECURRING SAVING (+)/COST (-)

ITEM	SAVINGS(+) COST (-)(1)	YEAR OF OCCURRENCE(2)	DISCOUNT FACTOR(3)	DISCOUNTED SAVINGS (+) COST (-)(4)
1.	$			$
2.	$			$
3.	$			$
4. TOTAL	$ 0			$ 0

C. TOTAL NON ENERGY DISCOUNTED SAVINGS (+)/COST(-) (3A2+3B2.4) $ 0

D. PROJECT NON ENERGY QUALIFICATION TEST

(1) 25% MAX NON ENERGY CAL (2F5 X .33)	$ 747,549

1. IF 3D1 IS = OR >3C GO TO ITEM 4
2. IF 3D1 IS < 3C CALC SIR = (2F5+3D1)/1F=
3. IF 3D12 IS => 1 GO TO ITEM 4
4. IF 3D12 is < 1 PROJECT DOES NOT QUALIFY

4. FIRST YEAR DOLLAR SAVINGS 2F3+3A+(3B12/YEARS ECONOMIC LIFE)	$ 136,851
5. TOTAL NET DISCOUNTED SAVINGS (2F5+3C)	$2,265,300
6. DISCOUNTED SAVINGS RATIO (IF < 1 PROJECT DOES NOT QUALIFY) (SIR)=(5/1F)=	3.02
7. E/C RATION (2F2/(1F/1000)= 32.0 MBTU/K$	

Encl (2)

SUMMARY SHEET

Montford Point (M-230)	1,185,404 KBTU =	1,185 MBTU
Montford Point (M-625)	5,219,778 KBTU =	5,220 MBTU
MCAS (H) (AS-4151)	5,284.426 KBTU =	5,284 MBTU
	11,689,608 KBTU	11,689 MBTU

Steam Costs based on MCB, CLNC Utilities Cost Analysis Report for FY-1982

Steam Plant:

M-230 - #2 Fuel Oil (1,185 MBTU Savings)
M-625 #6 Fuel Oil (5,220 MBTU Savings)
AS-4151 #6 Fuel Oil (5,284 MBTU Savings)

Total Savings:

#2 Fuel - 1,185 MBTU
#6 Fuel - 11,580 MBTU

Fuel Costs:

#2 Fuel Costs - 0.70/Gal
#6 Fuel Costs - $ 0.584/Gal

Steam Plant Efficiency:

M-230 - 51%
M-625 - 49.6%
AS-4151 54.4%

Fuel Costs:

#2 Fuel $ 0.70 ÷ .51 = $1.37/MBTU
#6 Fuel $ 0.584 ÷ 52 = $1.12/MBTU

		FY-82		FY-83		FY-84		FY-85		FY-86	
#2 Fuel	$1.37	X 1.105	X	1.14	X	1.14	X	1.14	X	1.14	= 2.56
#6 Fuel	$1.12	X 1.105	X	1.14	X	1.14	X	1.14	X	1.14	= 2.09

Construction Costs:

8"	-	3,245 ft	@ $22	=	$ 71,390
6"	-	9,535 ft	@ $18	=	$171,630
5"	-	5,505 ft	@ $17	=	$ 93,585
4"	-	7,495 ft	@ $16	=	$119,920
3"	-	14,420 ft	@ $12	=	$173,040
2"	-	1,200 ft	@ $10	=	$ 12,000
					$641,565

Escalated 1/83 - 4/90 1,361,702
(Projected NAVFAC Cost Guide)

Subtotal	$ 873,620
Contingency (10%)	87,362
Subtotal	960,982
SIOH (5.5%)	52,854
Subtotal	1,013,836
Design Costs	67,246

TABLE C-4

HEAT LOSS FROM BARE AND INSULATED PIPE*

Conditions: 250°F pipe temperature, 80°F ambient temperature, clacium-silicate insulation.

Pipe Size In.	Bare Pipe, Btu/fthr	Insulated Pipe, Btu/fthr, Thickness of Insulation, In					
		1	2	3	4	5	6
1	262	35	26	27	19	17	17
2	456	53	36	29	25	23	21
3	657	72	46	36	32	28	26
4	.833	87	55	43	36	32	29
6	1,202	125	75	56	46	40	35
8	1,543	158	92	69	55	48	43
10	1,902	192	108	80	66	56	50
12	2,246	215	125	93	75	64	57

* "The 1975 Energy Management Guidebook" published by Editors of Powers Magazine, McGraw Hill Inc., New York, N.Y. 1975.

FORMULA FOR HEAT LOSS SAVINGS

KBTU = (BTU/FT/HR (Before Insulation added)-BTU/FT/HR (After Insulation added)

X Linear Feet X Hours Heated Per Year) ÷ 1,000

A. INSULATION TO ABOVE-GROUND STEAM LINES

MONTFORD POINT

SIZE OF PIPE	LENGTH	EXISTING INSULATION	ADDED INSULATION
6"	1,250'	2"	2.0"
5"	2,300'	2"	2.0"
4"	3,960'	1"	3.0"
3"	11,575'	1.5"	2.5"
2.5"	220'	1"	3.0"
2"	200'	1"	3.0"

200 AREA OF MONTFORD POINT

5"	50'	0"	4.0"
5"	150'	1"	3.0"
4"	560'	1"	3.0"
3"	600'	1.5"	2.5"
2.5"	940'	1"	3.0"
	21,805' TOTAL		

AIR STATION

1.5"	250'	1"	3.0"
2"	750'	1"	3.0"
2.5"	420'	1"	3.0"
3"	665'	1"	3.0"
4"	2,975'	2"	2.0"
5"	3,005'	1"	3.0"
6"	8,285'	2"	2.0"
8"	3,245'	3"	1.0"
	19,595' TOTAL		

Pipe Size..... = 6"
Existing Insulation..... = 2.0
Insulation to be added.. = 2.0

Savings:

$$KBTU = \frac{75 - 46 \times 1{,}250' \times 8{,}760}{1{,}000}$$

KBTU = 317,550

Pipe Size..... = 5"
Existing Insulation..... = 2
Insulation to be added.. = 2

Savings:

$$KBTU = \frac{65 - 41 \times 2{,}300' \times 8{,}760}{1{,}000}$$

KBTU = 483,552

Pipe Size..... = 4"
Existing Insulation..... = 1.0
Insulation to be added.. = 3.0

Savings:

$$KBTU = \frac{87 - 36 \times 3{,}960 \times 8{,}760}{1{,}000}$$

KBTU = 1,769,170

Pipe Size..... = 3"
Existing Insulation..... = 1.5
Insulation to be added.. = 2.5

Savings:

$$KBTU = \frac{59 - 34 \times 11{,}575' \times 8{,}760}{1{,}000}$$

KBTU = 2,534,925

Pipe Size..... = 2-1/2"
Existing Insulation..... = 1.0
Insulation to be added.. = 3.0

Savings:

$$KBTU = \frac{62.5 - 28.5 \times 220 \times 8,760}{1,000}$$

KBTU = 65,525

Pipe Size..... = 2"
Existing Insulation..... = 1.0"
Insulation to be added.. = 3.0"

Savings:

$$KBTU = \frac{53 - 25 \times 200' \times 8,760}{1,000}$$

KBTU = 49,056

Pipe Size..... = 5"
Existing Insulation..... = 0" (Bare pipe)
Insulation to be added.. = 4"

Savings:

$$KBTU = \frac{1{,}018 - 41 \times 50' \times 8{,}760}{1{,}000}$$

KBTU = 427,926

Pipe Size..... = 5"
Existing Insulation .... = 1"
Insulation to be added.. = 3"

Savings:

$$KBTU = \frac{106 - 41 \times 150' \times 8{,}760}{1{,}000}$$

KBTU = 85,410

Pipe Size..... = 4"
Existing Insulation..... = 1.0
Insulation to be added.. = 3.0

Savings:

$$KBTU = \frac{87 - 36 \times 560 \times 8{,}760}{1{,}000}$$

KBTU = 250,186

Pipe Size..... = 2.5"
Existing Insulation..... = 1.0
Insulation to be added.. = 3.0

Savings:

$$KBTU = \frac{62.5 - 28.5 \times 940 \times 8{,}760}{1{,}000}$$

KBTU = 279,970

Pipe Size..... = 3"
Existing Insulation..... = 1.5
Insulation to be added.. = 2.5

Savings:

$$KBTU = \frac{59 - 32 \times 600 \times 8,760}{1,000}$$

KBTU = 141,912

AIR STATION

Pipe Size..... = 1.5"
Existing Insulation..... = 1.0
Insulation to be added.. = 3.0

Savings:

$$KBTU = \frac{44 - 22 \times 250 \times 8,760}{1,000}$$

KBTU = 48,180

Pipe Size..... = 2"
Existing Insulation..... = 1.0
Insulation to be added.. = 3.0

Savings:

$$KBTU = \frac{53 - 25 \times 750' \times 8,760}{1,000}$$

KBTU = 183,960

Pipe Size..... = 2.5"
Existing Insulation..... = 1.0
Insulation to be added.. = 3.0

Savings:

$$KBTU = \frac{62.5 - 32.5 \times 420' \times 8,760}{1,000}$$

KBTU = 110,376

Pipe Size..... = 3"
Existing Insulation..... = 1.0
Insulation to be added.. = 3.0

Savings:

$$KBTU = \frac{72 - 32 \times 665 \times 8,760}{1,000}$$

KBTU = 233,016

Pipe Size..... = 4"
Existing Insulation..... = 2.0
Insulation to be added.. = 2.0

Savings:

$$KBTU = \frac{55 - 36 \times 2,975 \times 8,760}{1,000}$$

KBTU = 495,159

Pipe Size..... = 5"
Existing Insulation..... = 1.0
Insulation to be added.. = 3.0

Savings:

$$KBTU = \frac{106 - 41 \times 3,005 \times 8,760}{1,000}$$

KBTU = 1,711,047

Pipe Size..... = 6"
Existing Insulation..... = 2.0
Insulation to be added.. = 2.0

Savings:

$$KBTU = \frac{75 - 46 \times 8,285 \times 8,760}{1,000}$$

KBTU = 2,104,721

Pipe Size..... = 8"
Existing Insulation..... = 3.0
Insulation to be added.. = 1.0

Savings:

$$KBTU = \frac{(69\ BTU/FT/HR) - (SS\ BTU/FT/HR) \times (3{,}245\ FT) \times (8{,}760\ HR.)}{1{,}000}$$

KBTU = 397,967

S-4

PWO:408:VMarkt
11000
12 JAN 1983

From: Commanding General
To: Commander, Atlantic Division, Naval Facilities Engineering Command, Norfolk, VA 23511

Subj: FY-86 Energy Conservation Investment Program (ECIP); submission of

Ref: (a) MCO P11000.12A
(b) CMC 151429Z DEC 82
(c) FONECON btwn Mr. V. MARSHBURN (Code 408, PWDNks, MCB, CLNC) and Mr. J. TORMA (Code 111, LANTDIV) of 4 Jan 83

Encl: (1) Project package for P-799, Add Insulation to Above-Ground Steam Lines, consisting of DD Form 1391/1391C and NAVMC Form 11069 w/Site Location Maps, dated 7 Jan 83
(2) Project package P-800, Radio Control Switches for Window Air Conditioners, consisting of DD Form 1391/1391C and NAVMC Form 11069 w/Site Location Map, dated 7 Jan 83
(3) Project package P-822, Facility Energy Improvements, consisting of DD Form 1391/1391C and NAVMC Form 11069 w/Site Location Map, dated 7 Jan 83

1. Reference (a) provided detailed guidance in preparation of ECIP project documentation. Reference (b) requested submission of the FY-86 ECIP Program. Reference (c) provided instruction for submission of ECIP projects utilizing the Life Cycle Cost Analysis Summary currently in scaling. Accordingly, enclosures (1) through (3) are hereby submitted for your review and continuing action.

T. MARSHALL
By direction

Advance Copy to: (w/encls)
CMC (LFF-2)

Copy to: (w/encls)
CO, MCAS(H) New River

1. COMPONENT	FY 1986 ENERGY CONSERVATION INVESTMENT PROGRAM MILITARY CONSTRUCTION PROJECT DATA	2. DATE
NAVY		7 Jan 83

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA 28542	ADD INSULATION TO ABOVE-GROUND STEAM LINES

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST ($000)
	882-22	P-799	$1,120.8

9. COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT COST	COST ($000)
ADD INSULATION TO STEAM LINES	LF	48,421	19.95	965.8
CONTINGENCY - 10%	LS	-	-	96.6
ESTIMATED CONTRACT COST	LS	-	-	1,062.4
SUPERVISION, INSPECTION & OVERHEAD - 5.5%	LS	-	-	58.4
TOTAL FUNDS REQUESTED	LS	-	-	1,120.8
INSTALLED EQUIP - OTHER APPROPRIATIONS	-	-	-	-

10. DESCRIPTION OF PROPOSED CONSTRUCTION

Install additional insulation and cover on 48,421 feet of above-ground steam lines.

11. REQUIREMENTS:

PROJECT: Add additional insulation and cover on above-ground steam lines at Camp Lejeune, Montford Point, and MCAS (H) New River.
REQUIREMENT: To reduce energy loss by eliminating heat loss through existing insulation.
CURRENT SITUATION: There is insufficient insulation of 48,421 feet of above-ground steam lines.
IMPACT IF NOT PROVIDED: Continued energy waste due to heat loss from insufficiently insulated steam lines.

VM

☆U.S. GOVERNMENT PRINTING OFFICE: 1979—603-076/3959 2-1

1. COMPONENT	ENERGY CONSERVATION INVESTMENT PROGRAM	2. DATE
NAVY	FY 1986 MILITARY CONSTRUCTION PROJECT DATA	7 Jan 83

3. INSTALLATION AND LOCATION

MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542

4. PROJECT TITLE	5. PROJECT NUMBER
ADD INSULATION TO ABOVE-GROUND STEAM LINES	P-799

SPECIAL CONSIDERATIONS

1. Pollution Prevention, Abatement, and Control: This project will not cause additional air or water pollution.

2. Flood Hazard Evaluation: Not applicable.

3. Environmental Impact: The project Environmental Impact Assessment has been made, reviewed, and where required, the design concepts give consideration to eliminating adverse environmental effects consistent with applicable directives.

4. Fallout Shelter Construction: Not applicable.

5. Design for Accessibility of Physically Handicapped Personnel: Not applicable.

6. Use of Air Conditioning: Not applicable.

7. Preservation of Historical Sites and Structures: Not applicable.

8. "New Start" Criteria for Commercial or Industrial Activities Program (OMB Circulat A-76): Not applicable.

VM

☆U.S. GOVERNMENT PRINTING OFFICE: 1979—603-076/7127 2-1

1. COMPONENT	ENERGY CONSERVATION INVESTMENT PROGRAM FY 1986 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
NAVY		7 JAN 83

3. INSTALLATION AND LOCATION	4. PROJECT TITLE
MARINE CORPS BASE CAMP LEJEUNE, NORTH CAROLINA 28542	FACILITY ENERGY IMPROVEMENT

5. PROGRAM ELEMENT	6. CATEGORY CODE	7. PROJECT NUMBER	8. PROJECT COST ($000)
	821-09	P-822	$23,000

9. COST ESTIMATES

ITEM	U/M	QUANTITY	UNIT COST	COST ($000)
FACILITY ENERGY IMPROVEMENT	LS	-	-	19,840
CONTINGENCY	LS	-	-	1,984
TOTAL CONTRACT COST	LS	-	-	21,824
SUPERVISION, INSPECTION, AND OVERHEAD	LS	-	-	1,200
TOTAL REQUEST	LS	-	-	23,024
TOTAL REQUEST (ROUNDED)	LS	-	-	23,000
EQUIPMENT PROVIDED FROM OTHER APPROPRIATIONS	LS	-	-	118,947

10. DESCRIPTION OF PROPOSED CONSTRUCTION

Provide a Co-Generation Plant capable of burning solid waste and producing 30,200lb/hour steam and 725KW of electricity during the initial year.

11. REQUIREMENT

PROJECT: Provide Co-Generation Plant for Camp Geiger and MCAS (H) New River.
REQUIREMENT: The Co-Generation Plant will reduce energy requirements for steam generation for Marine Corps Base, Camp Lejeune, N. C. and Marine Corps Air Station (H), New River. Further, utilization of solid waste from Marine Corps Base, Camp Lejeune, N. C. and MCAS (H) Cherry Point will eliminate costly expansion of facility landfills.
CURRENT SITUATION: Steam is generated using costly fossil fuel with the present value cost for 25 years operation of $86.5 million dollars. Current landfill operations at Marine Corps Base, Camp Lejeune, N. C. and MCAS Cherry Point will require extensive improvements to contain estimated increases in solid waste disposal.
IMPACT IF NOT PROVIDED: The activity will not be able to avail itself of the energy savings offered by this project.

VM

ENCLOSURE (3)

1. COMPONENT	ENERGY CONSERVATION INVESTMENT PROGRAM FY 19 86 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
NAVY		7 JAN 83

3. INSTALLATION AND LOCATION	
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542	
4. PROJECT TITLE	**5. PROJECT NUMBER**
FACILITY ENERGY IMPROVEMENT facility ener	P-822

SPECIAL CONSIDERATIONS

1. Pollution Abatement Requirement: Will be identified by the environment impact review and incorporated into the design of this facility.

2. Flood Hazard Evaluation: Requirements of Executive Order No. 11296 (Flood Hazards) are not applicable.

3. Environmental Impact: The project Environmental Impact Assessment will be written and processed through the local EIA Review Board.

4. Fallout Shelter Construction: Fallout shelter protection is not incorporated in this project.

5. Design for Accessibility of Physically Handicapped Personnel: Provisions for physically handicapped personnel are not incorporated in this project.

6. Use of Air Conditioning: Ceiling "U" factors will be made to conform with DOD 4270.1-M.

7. Preservation of Historical Sites and Structures: This project does not directly or indirectly affect a district, site, building, structure, jobject, or setting which is listed in the National Register or otherwise possesses a significant quality of American history.

8. "New Start" Criteria for Commercial or Industrial Activities Program (OMB Circular A-76): Not applicable.

1. COMPONENT	FY 1986 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
NAVY		7 JAN 83

3. INSTALLATION AND LOCATION
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542

4. PROJECT TITLE	5. PROJECT NUMBER
FACILITY ENERGY IMPROVEMENT	P-822

FACILITY STUDY

1. Project: This project provides a positive means to reduce cost of steam production for Marine Corps Base, Camp Lejeune, N. C. (Camp Geiger) and MCAS (H) New River. Further this project will generate electricity which will defer energy consumption and be a positive impact on energy reduction efforts.

2. Current and Planned Future Workload with regard to this project: This project will generate steam and electricity for schools, administrative facilities at Camp Geiger and MCAS (H) New River. The facilities and their demand for energy are expected to continue as a necessary requirement throughout the life of the project.

3. Description of Proposed Construction:

a. Type of Construction: This project will provide a permanent facility with a 25 year life span.

b. Replacement: Boiler Plant G-650 may be shut down pending actual co-generation plant efficiency and generating capabilities.

c. Description of work to be done:

(1) Primary Facility: Provide a permanent solid waste burning steam plant with secondary capability of generating electricity.

(2) Energy Conservation: This project will save 414,777 MBTU's of energy per year.

(3) Collateral Equipment: Requirements will be determined during preliminary design procedures.

(4) Supporting Facilities: This project will provide a co-generation plant that will relieve steam generating requirements for G-650 and AS4151 steam plant during the summer months.

4. Cost Estimate: Costs were derived from the Solid Waste and Wood Waste Burning and Co-Generation Study as accomplished by J. E, Sirrine Company. Costs were escalated to FY-86 vice FY-87 as submitted by the study.

5. Justification for Project and for Scope of Project:

1. COMPONENT	FY 19 86 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
NAVY		7 JAN 83

3. INSTALLATION AND LOCATION

MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542

4. PROJECT TITLE	5. PROJECT NUMBER
FACILITY ENERGY IMPROVEMENT	P-822

a. Justification for Project:

(1) Project: The proposed project will provide for energy conservation in the form of steam and electrical generation.

(2) Requirement: This project is a result of Executive Order 12003 of July 1977, which established government wide energy conservation goals that require a 20% reduction in average annual comsumption. Energy shortages and substantially increased costs for energy have also made energy conservation a necessity.

(3) Current Situation: Current steam generation utilizes expensive fossil fuels for operation of steam plants G-650 and AS-4151.

(4) Impact if Not Provided: Continued operation of steam plants utilizing expensive fuels. Further the continued impact of solid waste disposal will mandate expensive modifications to current landfill oeprations.

b. Justification for Scope of Project: This project will have a significant impact in energy requirements for steam generation at Camp Geiger and MCAS (H) New River and will greatly enhance this Commands ongoing attempt at energy conservation.

6. Equipment Provided from Other Appropriations: $118,947 will be required for purchase of a truck and disposal containers in support of this facility.

7. Common Support Facilities: This project will supplement steam generating requirements of steam plant G-650 and AS-4151.

8. Effect on Other Resources: An increase in manpower to facilitate operation of this plant will be required and consists of the following:

4 Crane Operators WG-8
4 Boiler Operators WG-7
4 Boiler Mechanics WG-10
3 Supervisors WS-7

9. Siting of the Project: See Enclosure (1).

10. Other Graphic Presentations, including Photographs: See Enclosure (2).

11. Economic Analysis: An ECIP economic analysis has been made with

S/N 0102-LF-001-3915 ☆U.S. GOVERNMENT PRINTING OFFICE: 1979—603-076/7127 2-1

1. COMPONENT	FY 19 86 MILITARY CONSTRUCTION PROJECT DATA	2. DATE
NAVY		7 JAN 83

3. INSTALLATION AND LOCATION	
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542	
4. PROJECT TITLE	**5. PROJECT NUMBER**
FACILITY ENERGY IMPROVEMENT	P-822

support documentation. See Enclosure (3).

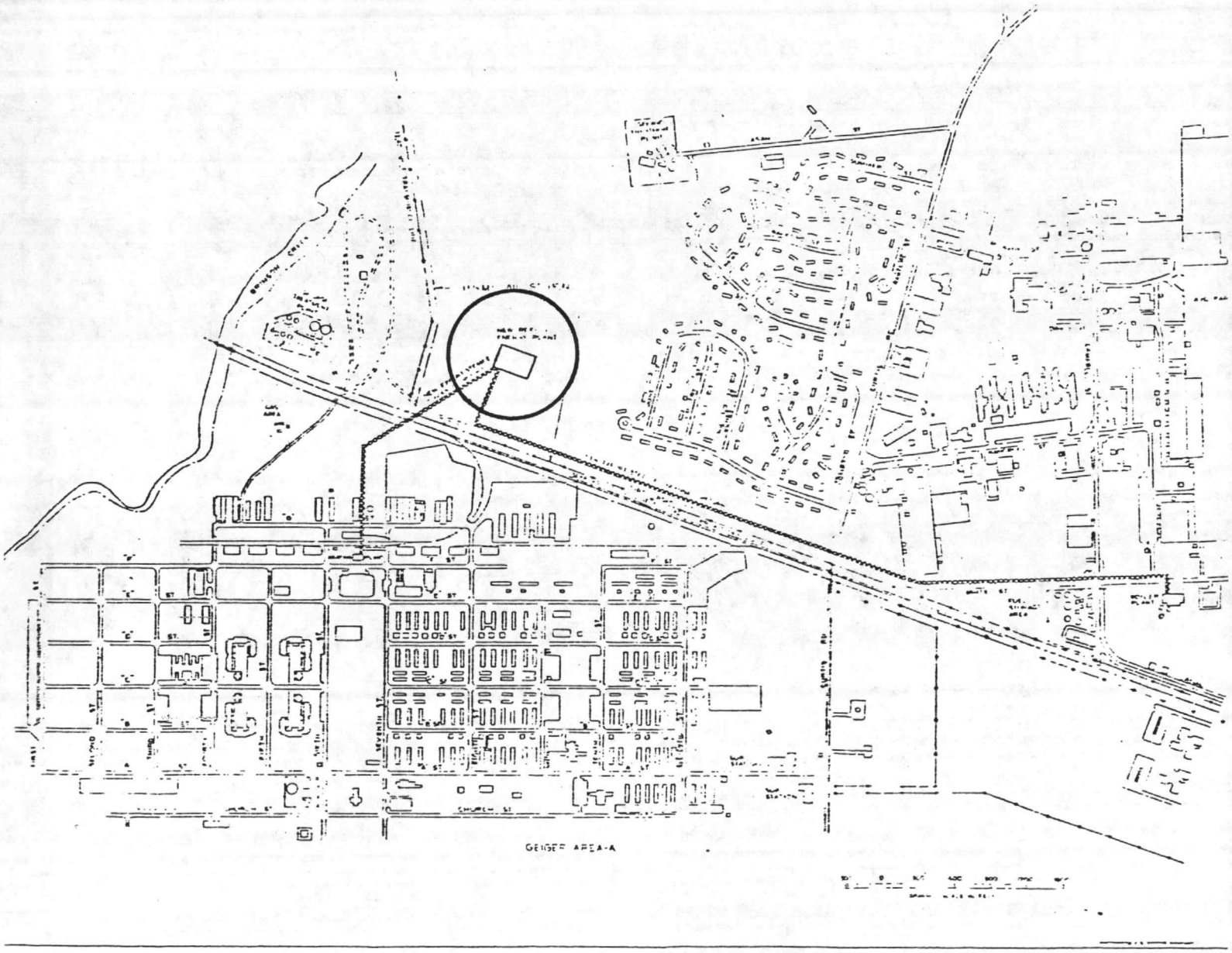
12. Environmental Impact: An Environmental Impact Assessment will be written and processed through the local Environmental Impact Assessment Review Board.

13. Quantitative Data: Not applicable.

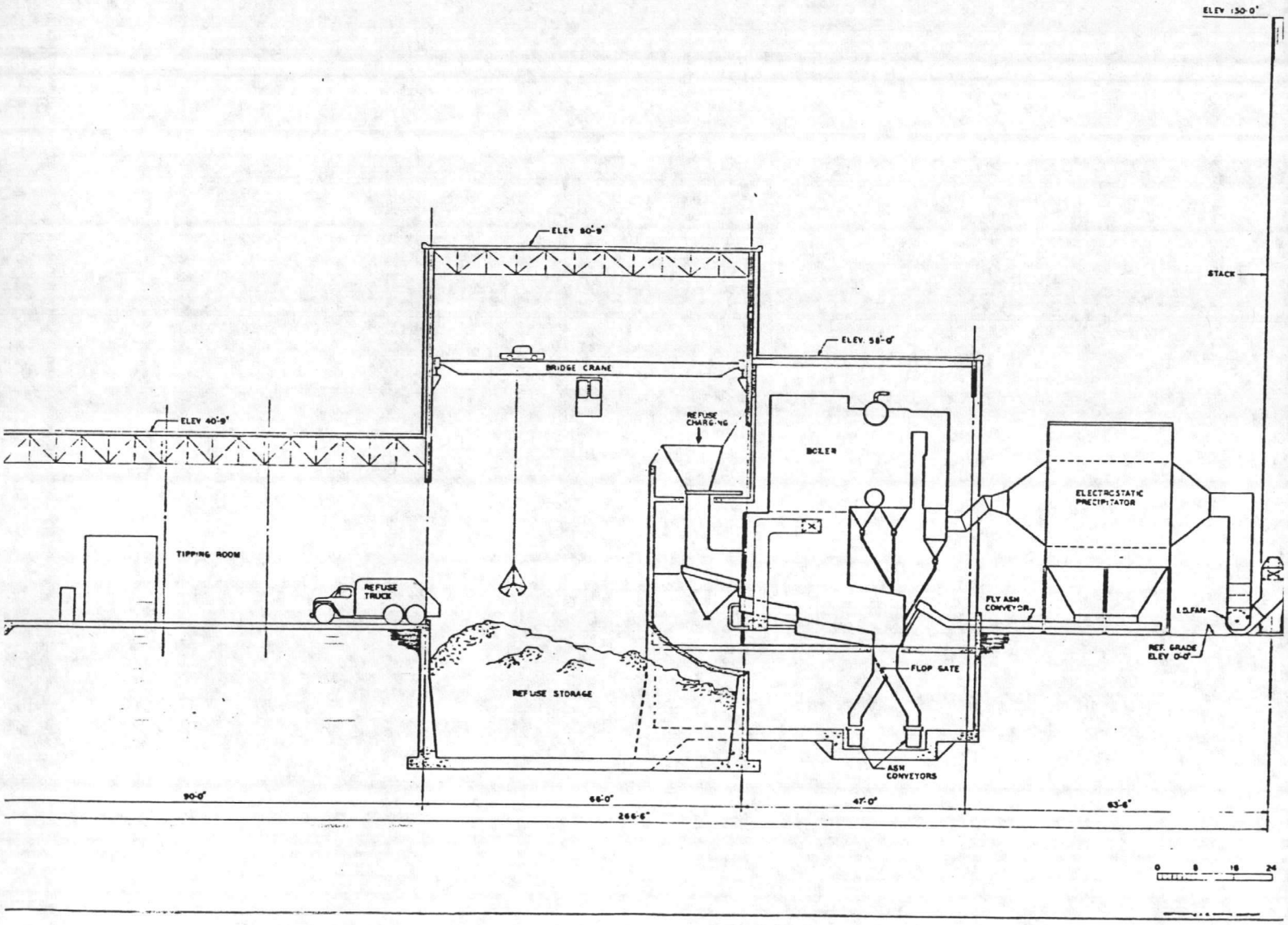
☆U.S. GOVERNMENT PRINTING OFFICE: 1979—603-076/7127 2-1

SITE LOCATION MAP

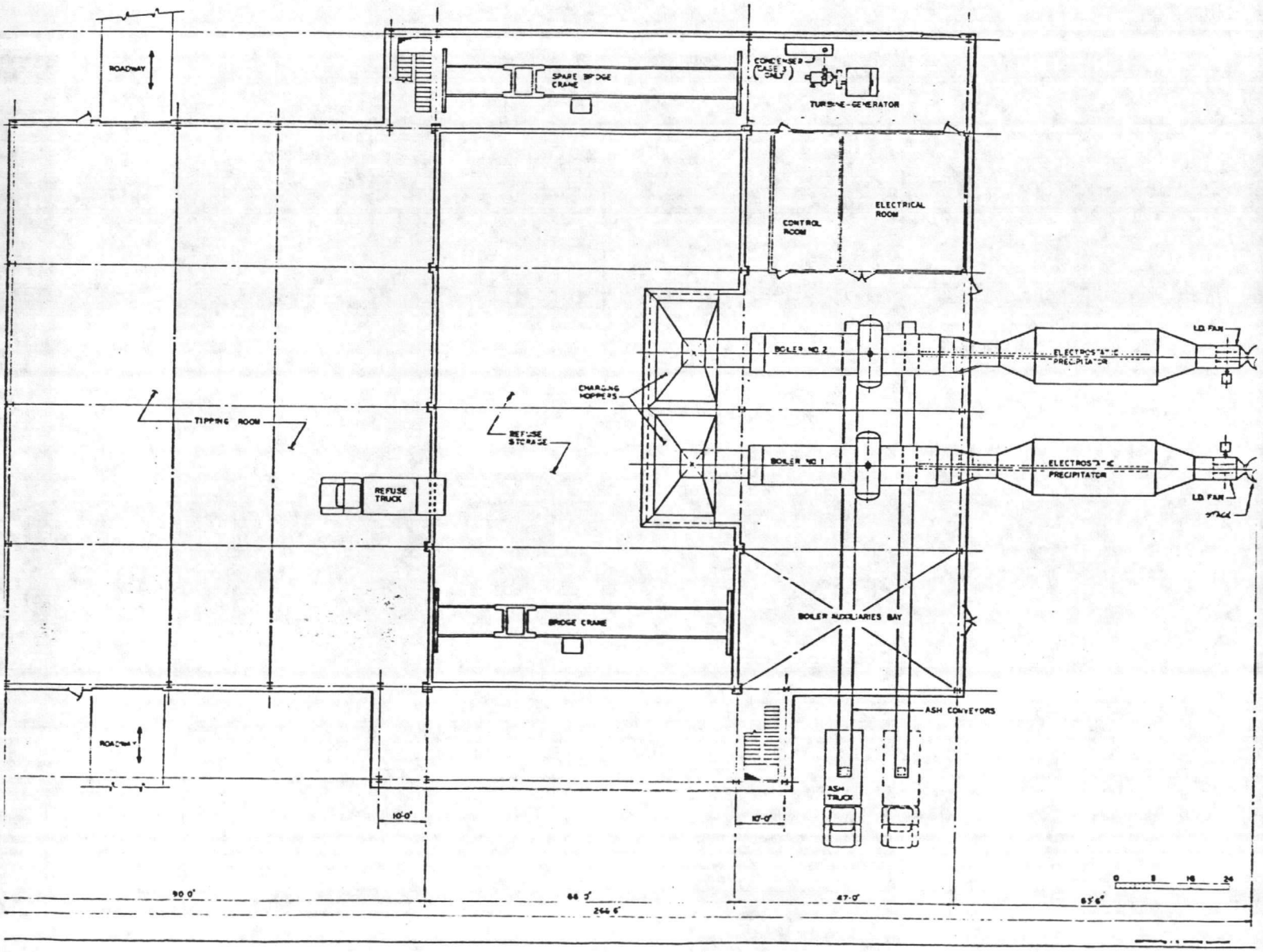
P-822, proposed CO-GENERATION PLANT



P-822, proposed CO-GENERATION PLANT



P-822, proposed CO-GENERATION PLANT



LIFE CYCLE COST ANALYSIS SUMMARY
ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP)

LOCATION: MCB, CAMP LEJEUNE, NORTH CAROLINA REGION NO. ____ PROJECT NUMBER P-822

PROJECT TITLE FACILITY ENERGY IMRPOVEMENT FISCAL YEAR 1986

DISCRETE PORTION NAME CO- GENERATION OF STEAM AND ELECTRICITY.

ANALYSIS DATE _____ ECONOMIC LIFE 25 YEARS PREPARED BY V. MARSHBURN

1. INVESTMENT

A. CONSTRUCTION COST	$ 21,824,415	
B. SIOH	$ 1,200,342	
C. DESIGN COST	$ 1,223,906	
D. ENERGY CREDIT CALC (1A+1B+1C)X.9	$ 21,823,796	
E. SALVAGE VALUE OF EXISTING EQUIPMENT	-$	
F. TOTAL INVESTMENT (1D-1E)		$21,823,796

2. ENERGY SAVINGS (+) / COST (-)
ANALYSIS DATE ANNUAL SAVINGS, UNIT COST & DISCOUNTED SAVINGS

FUEL	COST $/MBTU(1)	SAVINGS MBTU/YR(2)	ANNUAL $ SAVINGS(3)	DISCOUNT FACTOR(4)	DISCOUNTED SAVINGS(5)
A. ELEC	$ 5.45	33,192	$ 180,896	18.049	$ 3,264,991
B. DIST	$ 11.48	381,586	$ 4,380,607	20.05	$ 87,831,170
C. RESID	$		$		$
D. NG	$		$		$
E. COAL	$		$		$
F. TOTAL		414,778	$ 4,561,503	---------->	$91,096,161

3. NON ENERGY SAVINGS(+) / COST(-)

A. ANNUAL RECURRING (+/-)		$ - 411,543
(1) DISCOUNT FACTOR (TABLE A)	9.524	
(2) DISCOUNTED SAVING/COST (3A X 3A1)		$-3,919,535

B. NON RECURRING SAVINGS(+) / COST(-)

ITEM	SAVINGS(+) COST (-)(1)	YEAR OF OCCURRENCE(2)	DISCOUNT FACTOR(3)	DISCOUNTED SAVINGS(+) COST(-)(4)
a.	$ 65,658	5	.652	$ 42,809
b.	$ 65,658	10	.405	$ 26,591
c.	$ 65,658	15	.251	$ 16,480
d.	$ 65,658	20	.156	$ 10,242
e. TOTAL	$262,632			$ -96,122

C. TOTAL NON ENERGY DISCOUNTED SAVINGS(+) / COST(-) (3A2+3Bd4) $-4,015,657

D. PROJECT NON ENERGY QUALIFICATION TEST
(1) 25% MAX NON ENERGY CALC (2F5 X .33) $ 30,061,733
a IF 3D1 IS = OR > 3C GO TO ITEM 4
b IF 3D1 IS < 3C CALC SIR = (2F5+3D1) ÷ 1F= _____
c IF 3D1b IS = > 1 GO TO ITEM 4
d IF 3D1b IS < 1 PROJECT DOES NOT QUALIFY

4. FIRST YEAR DOLLAR SAVINGS 2F3+3A+(3B1d ÷ YEARS ECONOMIC LIFE) $ 631,462

5. TOTAL NET DISCOUNTED SAVINGS (2F5+3C) $87,080,504

SUMMARY

LIFE CYCLE COST ANALYSIS

Information utilized inthis analysis was obtained from the Solid Waste and Wood Waste Burning and Coal - Generation Study as provided by LANTNAVFAC-ENGCOM . The study pertaining to Co-Generation is attached as supporting documentation.

I. INVESTMENT:

Construction Cost	$21,824,415
SIOH	1,200,342
Design Cost	1,223,906

II. ENERGY SAVINGS

Co-Generation Plant

a. Usage (Page VI-14)
(3,402,000 KWH/year) X (.0116 MBTU/KWH) = $39,463 MBTU

b. Resources Generated (Page VI-17)
$\frac{(640 \text{ KW/HR} + 790 \text{ KW/HR})}{2}$ = 715 KW/HR Average

(715 KW/HR X (8,760 HRS) = 6,263,400 KWH/Year

(6,263,400 KWH) (.0116 MBTU/KWH) = + $72,655 MBTU

Oil-Fired Plants (Status Quo)

a. Usage (Page VI-25)
$\frac{(38.99 \text{ MBTU/HR} + 48.13 \text{ MBTU/HR})}{2}$ = 43.56 MBTU/HR Average

(43.56 MBTU/HR) X (8,760 HR/Year) = 381,586 MBTU/Year

III. ENERGY COSTS

a. Electricity (.03434¢/KW) ÷ (.0116 MBTU/KW) = $2.9603/MBTU
$2.96 X 1.13 X 1.13 X 1.13 X 1.13 X 1.13 = $5.45/MBTU

b. Fuel Oil (Page VI-25) $11.48/MBTU

IV. Non-Energy (Annual) Costs (Recurring) Pages VI-18 and VI-26)

Co-Generation		Oil-Fired Boilers (Status Quo)	
Labor	$437,951	CP Development	$124,556
Maintenance	241,018	CL Development	458,529
Trash Transfer	345,527	CP Maintenance	18,310
Ash Disposal	17,951	CL Maintenance	29,508
TOTAL	$1,042,447	TOTAL	$630,903

Net Non-Energy Annual Costs:

$1,042,447 - $630,903 = $411,543

V. Non-Recurring Costs

a. Co-Generation Plant - Plant overhaul (Page VI-13)

$65,658/Year every 5 years.

Cost Estimate

DEPARTMENT DIRECT COST SUMMARY

CASE 2 - BACK PRESSURE TURBINE

Equipment	$ 8,984,000	
Equipment Erection	170,600	
Equipment Foundations and Other Costs	294,400	
Buidings & Structures	3,700,000	
Electrical Installation Cost	463,000	
Instrumentation Installation Cost	250,000	
Piping Cost	2,246,000	
Area Cost	380,000	
SUBTOTAL CONSTRUCTION COST		$ 16,488,000
SIOH @ 5.5% (Supervision, inspection & overhead)		906,800
Contingency @ 10%		1,739,500
TOTAL CONSTRUCTION COST		$ 19,134,300

ITEMIZED CONSTRUCTION COST ESTIMATE

EQUIPMENT LIST
CASE 2

Item Description	Motor HP-RPM	Equipment $	Equipment Erection $	Equip. Supports Platforms and Other Costs $
1. Boiler, 100 T/D Maximum Input 600 PSIG 725°F Unit No. 1		2,750,000	w/Equipment	w/Bldg. Cost
2. F.D. Fan		Incl.	w/Equipment	4,000
Coupling		Incl.	w/Equipment	
Controls		Incl.	w/Equipment	
Motor	50	Incl.	w/Equipment	
Intake Silencer		Incl.	w/Equipment	
3. Combustion Controls		Incl.	w/Equipment	
4. Boiler Breeching		Incl.	w/Equipment	w/Bldg.
5. Economizer		Incl.	w/Equipment	w/Bldg.
6. Stoker	10	Incl.	w/Equipment	w/Boiler
7. I.D. Fan		Incl.	w/Equipment	7,000
Coupling		Incl.	w/Equipment	
Fluid Drive		Incl.	w/Equipment	
Motor	75	Incl.	w/Equipment	
8. Precipitator No. 1		600,000	w/Equip. Cost	20,000
9. Ductwork - To Precip., Fan, Stack w/Insulation		45,000	D&E	65,000
10. Expansion Joints		12,000	2,000	N/A
11. Isolation Damper	5	28,000	2,000	Incl.
12. Boiler, 100 T/D Maximum Input 600 PSIG 725°F Unit No. 2		2,750,000	w/Equip. Cost	w/Bldg.
13. F.D. Fan		Incl.	Incl.	4,000
Coupling		Incl.	Incl.	Incl.
Controls		Incl.	Incl.	Incl.
Motor	50	Incl.	Incl.	Incl.
Intake Silencer		Incl.	Incl.	Incl.

ITEMIZED CONSTRUCTION COST ESTIMATE

EQUIPMENT LIST
CASE 2

Item Description	Motor HP-RPM	Equipment $	Equipment Erection $	Equip. Supports Platforms and Other Costs $
14. Combustion Controls		Incl.	Incl.	
15. Boiler Breeching		Incl.	Incl.	w/Bldg.
16. Economizer		Incl.	Incl.	w/Bldg.
17. Stoker	10	Incl.	Incl.	w/Boiler
18. I.D. Fan		Incl.	Incl.	7,000
Coupling		Incl.	Incl.	
Fluid Drive		Incl.	Incl.	
Motor	75	Incl.	Incl.	
19. Precipitator No. 2		600,000	Incl.	20,000
20. Ductwork - To Precip., Fan, Stack w/Insulation		45,000	D&E	65,000
21. Expansion Joints		12,000	2,000	N/A
22. Isolation Damper	5	28,000	2,000	N/A
23. Ash Handling System	80 (Total)	575,000	Incl.	w/Bldg.
24. Overhead Crane - 5 Ton		375,000	50,000	w/Bldg.
Control Cab		Incl.		
Grapple		Incl.		
Bridge Motor	15	Incl.		
Trolley Motor	10	Incl.		
Hoist Motors (2)	10 (Ea)	Incl.		
25. Spare Crane		375,000	50,000	w/Bldg.
Control Cab		Incl.		
Grapple		Incl.		
Bridge Motor	15	Incl.		
Trolley Motor	10	Incl.		
Hoist Motors (2)	10 (Ea)	Incl.		
26. Deaerator		30,000	2,000	1,500
27. Blow-Off Tank		5,000	1,000	100

021882

ITEMIZED CONSTRUCTION COST ESTIMATE

EQUIPMENT LIST
CASE 2

Item Description	Motor HP-RPM	Equipment $	Equipment Erection $	Equip. Supports Platforms and Other Costs $
28. Continuous Blowdown System		17,000	2,500	500
Flash Tank		Incl.	Incl.	
Heat Exchanger		Incl.	Incl.	
Valves		Incl.	Incl.	
29. Condensate Tank		15,000	1,000	100
30. Condensate Transfer Pump		3,000	500	200
Motor	10	Incl.	500	200
31. Air Compressor	25	6,000	500	200
Air Receiver		Incl.		
32. Air Compressor	25	6,000	500	200
Air Receiver		Incl.		
33. Air Dryer		3,000	200	100
34. Stack - Dual Wall (2) 150' x 9'-0" Dia.		310,000	Incl.	90,000
35. Raw Water Booster Pump		3,000	500	100
Motor	20	Incl.	Incl.	Incl.
36. Raw Water Booster Pump		3,000	500	100
Motor	20	Incl.		
37. Feedwater Treatment Equipment	30 Total	70,000	8,000	1,000
38. Boiler Feed Pumps (2)		16,000	1,000	1,000
Motor	2 @ 75	Incl.	Incl.	Incl.
39. Boiler Feed Pump		8,000	500	500
Turbine		12,000	Incl.	Incl.
40. Chemical Feed Equipment	2 @ 5	10,000	800	300

ITEMIZED CONSTRUCTION COST ESTIMATE

EQUIPMENT LIST
CASE 2

Item Description	Motor HP-RPM	Equipment $	Equipment Erection $	Equip. Supports Platforms and Other Costs $
41. Camp Geiger Condensate Transfer				
Pump		7,000	500	100
Motor	30	Incl.	200	Incl.
42. Air Station Condensate Transfer				
Pump		7,000	500	100
Motor	50	Incl.	200	Incl.
43. Condensate Collection Tank		15,000	500	200
Pump		3,000	200	100
Motor	10	Incl.	Incl.	Incl.
44. No. 2 Oil Storage Tank & Pump 10,000 Gallon	5	25,000	500	500
45. HVAC Equipment	20	15,000	Incl.	500
46. Turbine Generator 900 KW Nominal Output 12,470 Volt Generator 1175 KVA Rating		200,000	40,000	4,800
TOTAL, Equipment		$8,984,000	$170,600	$294,400

ITEMIZED CONSTRUCTION COST ESTIMATE

CASE 2

47. Buildings and Structures	
Structural Steel	$ 880,000
Excavation and Backfill	445,000
Refuse Pit and Basement	690,000
Mat	365,000
Piling	86,000
Roof Deck and Roofing	190,000
Walls and Siding	270,000
Intermediate Floors	89,000
Stairs, Doors and Drains	160,000
Miscellaneous Steel and Grating	135,000
Support Steel and Miscellaneous	390,000
TOTAL, Building and Structures	$ 3,700,000
48. Electrical	
Building Lighting	63,000
Electrical Equipment & Wiring	400,000
TOTAL, Electrical	$ 463,000
49. Instrumentation	$ 250,000
50. Piping	
Boiler Plant	870,000
Export Steam & Condensate Return Lines	1,376,000
TOTAL, Piping	$ 2,246,000
51. Area	
Area	$ 130,000
Road Paving	250,000
TOTAL, Area	$ 380,000

CASE 2

DESIGN ANALYSIS COMPUTATIONS

JANUARY 1982

(Present Value = 1986 Dollars)

ALTERNATIVE A - Refuse-Burning Plant

1. Investment Cost

a. Refuse-Burning Plant Capital Costs (from equipment list)

Construction $16,488,000

Escalated to April 1985

$16,488,000 X $\frac{2167}{1870}$ = $19,106,682

Escalated to FY86 10% Discount (2% differential)
$19,106,682 X 1.0384 = $19,840, 378

Total Escalated Cost		$19,840,378
Contingency @ 10%		1,984,037
S.I.O.H. @ 5.5%		1,200,342
	TOTAL	23,024,757

Engineering @ 6% = $989,280

Escalated to April 1984

$$\$989,280 \times \frac{2066}{1870} = \$1,092,969$$

Escalated to FY-86

10% Discount (2% differential)

$1,092,969 X 1.1198 = $1,223,906

Total Present Value Construction & Engineering

	$23,024,757
	+1,223,906
TOTAL	$24,248, 663

b. Capital Costs for Ash Disposal

~~Investment for truck ($70,000) and disposal containers ($26,000)~~
$96,000 in years 1,9, 17

Escalated to Oct. 1986
$96,000 X $\frac{2317}{1870}$ = $118,947

10% Discount (2% differential) year 1	.963	
Present Value		$114,545
10% Discount (2% differential) year 9	.526	
Present Value		$ 62,566
10% Discount (2% differential) year 17	.288	
Present Value		34,256
Total Present Value Ash Disposal Investment		$211,367

2. Recurring Costs

a. Annual Boiler Plant Labor Costs

4 Crane Operators (WG-8) @ $9.98/hr. (incl. benefits)
4 Boiler OPerators (WG-7) @ 9.43/hr. (incl. benefits)
4 Boiler Mechanics (WG-10) @ 11.09/hr. (incl. benefits)
3 Supervisors (WS-7) @ $12.78/hr. (incl. benefits)

Unescalated Labor Cost

(4 x 9.98 x 2080) + (4 x 9.43 x 2080) + (4 x 11.09 x 2080)
+ (3 x 12.78 x 2080) = $333,508

Labor escalated to Oct. 1986

	FY82	FY83	FY84	FY85	FY86	
$333,508	x 1.056	x 1.056	x 1.056	x 1.056	x 1.056	= 437,951

2. 10¢ Discount (0% differential) 9.524

Present Value Labor Cost $4,171,048

b. Annual Boiler Maintenance Cost

ITEM	INSTALLED COST ($ X 10^3)	MAINT. FACTOR	COST ($ X 10^3)
Boilers & Fans	3,250	0.025	81.25
Precipitators	1,200	0.015	18.00
Ducts & Stack	245	0.010	2.45
Ash Handling	575	0.025	14.38
Pumps	33	0.015	0.50
Water Treatment	37	0.020	.74
Building	3,400	0.005	17.00
Internal Piping	740	0.005	3.70
Export Piping	1,376	0.010	13.76
Cranes	850	0.020	17.00
Electrical Instrumentation	538	0.020	10.76
Turbine Generator	200	0.020	4.00
Total Unescalated Maintenance			183.54

Maintenance escalated to Oct. 1986

	Fy 82	Fy 83	Fy 84	Fy 85	Fy 86	
$183,540 x	1.056 x	1.056 x	1.056 x	1.056 x	1.056 =	$241,018

10% Discount (0% differential) 9.524

Present Value Maintenance Costs $2,295,459

c. Plant Overhaul

$ 50,000 every 5 years

Escalated to Oct. 1986

	Fy 82		Fy 83		Fy 84		Fy 85		Fy 86		
$ 50,000	x	1.056	x	1.056	x	1.056	x	1.056	x	1.056	= $65,658

10% Discount (0% differential) year 5 Present Value Overhaul Cost	.652	$ 42,809
10% Discount (0% differential) year 10 Present Value Overhaul Cost	.405	$ 26,591
10% Discount (0% differential) year 15 Present Value Overhaul Cost	.251	$ 16,480
10% Discount (0% differential) year 20 Present Value Overhaul Cost	.156	$ 10,242
Total Present Value Overhaul Costs		$ 96,122

d. Annual Incremental Electrical Costs

SERVICE	POWER (KW)	USE FACTOR	EFFECTIVE POWER
Pumping Power*	110	0.8	88
Crane Operation	30	1.0	30
Precipitators	400	0.8	320
Ash Handling	60	0.8	48
		TOTAL	486 KW

* NOTE: Feedwater pumping is not included since a reduction in existing feedwater pumping will be realized. Adjustment is made for higher pressure feedwater.

Annual Demand Cost Increase
486 KW X $ 73.598/KW = $ 35,769/yr.

Annual KWH Increase
486 KW X 7000 hrs/yr. = 3,402,000 KWh/yr.

Annual Dollar Increase per KWH
3,402,000 KWh/hr. X $ .02726/KWh = $ 92,738/yr.

Total Annual Increase Electrical Cost
$ 35,769 + $ 92,738 = $ 128,507

Escalated to Oct. 1986

	FY82	FY83	FY84	FY85	FY86	
$128,507 X	1.13 X	1.13 X	1.13 X	1.13 X	1.13 =	$236,765

10% Discount (7% differential) 18.049

Present Value Incremental Electrical Cost $4,273,386

e. Annual Trash Transfer Cost from Cherry Point to Lejeune

$10/ton (1977) escalated to Oct. 1986

$10 X $\frac{2317}{1355}$ = $17.10

	Yr. of Op.	Tons/yr.	$/yr.	10% Discount (0% differential)	Present Value
1986	1	15,538	$ 265,699	.954	$ 253,477
	2	15,793	270,060	.867	234,142
	3	16,048	274,420	.788	216,243
	4	16,303	278,781	.717	199,886
1990	5	16,558	283,141	.652	184,608
	6	16,813	287,502	.592	170,201
	7	17,068	291,862	.538	157,022
	8	17,323	296,223	.489	144,853
	9	17,578	300,583	.445	133,759
	10	17,833	304,944	.405	123,502
	11	18,088	309,304	.368	113,824
	12	18,343	313,665	.334	140,764
	13	18,598	318,025	.304	96,679
	14	18,853	322,386	.276	88,978
2000	15	19,108	326,746	.251	82,013
	16	19,363	331,107	.228	75.492
	17	19,618	335,467	.208	69,777
	18	19,873	339,823	.189	64,227
	19	20,128	344,188	.172	59,200
	20	20,383	348,549	.156	54,373
	21	20,638	352,909	.142	50,113
	22	20,893	357,270	.129	46,087
	23	21,148	361,630	.117	42,310
	24	21,403	365,991	.107	39,161
2010	25	21,658	370,351	.097	35,924
Total Present Value Transfer Cost					$2,840,615

f. Annual Ash Disposal Cost

	Yr. of Op.	1982 $*	1986 $*	10% Discount (0% differential)	Present Value
1986	1	$ 13,702	$ 16,886	.954	$ 16,109
	2	13,756	16,952	.867	14,698
	3	13,862	17,083	.788	13,461
	4	13,916	17,150	.717	12,296
1990	5	14,022	17,280	.652	11,267
	6	14,075	17,346	.592	10,268
	7	14,128	17,411	.538	9,367
	8	14,950	18,424	.489	9,009
	9	15,003	18,489	.445	8,227
	10	15,110	18,621	.405	7,541
	11	15,163	18,686	.368	6,876
	12	15,216	18,752	.334	6,263
	13	15,269	18,817	.304	5,720
	14	15,323	18,884	.276	5,212
2000	15	15,376	18,949	.251	4,756
	16	15,429	19,014	.228	4,335
	17	15,535	19,145	.208	3,982
	18	15,588	19,210	.189	3,630
	19	15,642	19,277	.172	3,315
	20	15,748	19,407	.156	3,027
	21	15,802	19,474	.142	2,765
	22	15,855	19,539	.129	2,520
	23	15,908	19,605	.117	2,293
	24	16,014	19,735	.107	2,111
2010	25	16,067	19,800	.097	1,920
Total Present Value Ash Disposal Cost					$ 170,968

* Escalation from 1982 to 1986 = $\frac{2317}{1880}$ = 1.2324

Ash - 80 lbs/cf. 30% moisture

Ash Disposal - 5 days per week

3. Benefits -

Revenues generated from sales of electricity to CP&L

Year		Av. Kw/hr Generated	*Net Revenue Jan. 1982 $	** Oct, 1986 $	10% Discount (7% differential)	Present Value
1986	1	640	$232,640	$428,624	.986	$ 422,623
	2	646	234,821	432,642	.959	414,904
	3	655	238,092	438,669	.933	409,278
	4	660	239,910	442,019	.908	401,353
	5	670	243,545	448,716	.883	396,216
	6	674	244,999	451,395	.859	387,748
	7	680	247,180	455,413	.836	380,725
	8	685	248,998	458,763	.813	372,974
	9	690	250,815	462,110	.791	365,529
	10	700	254,450	468,808	.769	360,513
	11	705	256,268	472,157	.748	353,174
	12	710	258,085	475,505	.728	346,168
	13	715	259,902	478,853	.708	339,028
	14	720	261,720	482,202	.688	331,755
2000	15	725	263,538	485,552	.670	325,320
	16	730	265,355	488,899	.651	318,273
	17	740	268,990	495,597	.634	314,208
	18	745	270,808	498,946	.616	307,351
	19	750	272,625	502,294	.600	301,376
	20	750	276,260	508,991	.583	296,742
	21	766	278,441	513,009	.567	290,876
	22	770	279,895	515,688	.552	284,660
	23	775	281,712	519,036	.537	278,722
	24	785	285,348	525,735	.522	274,434
2010	25	790	287,165	529,083	.508	268,774
				Total Present Value Electricity Renvenues Benefit		$8,542,724

* Source: CP&L Schedule CSP-3B effective 9-24-82 Variable Energy Credit and 10-Year Capacity Credit

**Escalation from Jan. 1982 to Oct. 1986 =

FY82 FY83 FY84 FY85 FY86
1.13 X 1.13 X 1.13 X 1.13 X 1.13 = 1.842435

Summary Sheet Alternative 2A - Total Present Value

Investment Cost	
~~Boiler Plant~~	~~$24,248,663~~
Ash Disposal	211,367
Recurring Costs	
Labor	4,171,048
Maintenance	2,295,459
Plant Overhaul	96,122
Incremental Electrical	4,273,386
Trash Transfer	2,840,615
Ash Disposal	170,968
Total Present Value Cost	$38,307,628
Less Present Value Benefits Sale of Electricity	8,542,724
Net Present Value Alterantive 2A	$29,764,904
Discount Factor 9.524	
Uniform Annual Cost	$ 3,125,252

ALTERNATIVE B - Incremental Cost of Refuse Landfills at Cherry Point and Camp Lejeune

1. Investment Costs

a. ~~Incremental Cost of Landfill - Cherry Point~~

Capital Cost
$298,704 (1977) in year 5

Escalated to Oct 86
$298,704 X $\frac{2317}{1355}$ = $510,772

10% Discount (2% differential) year 5	.712	
Present Value Capital Cost		$363,669

Capital Cost
$36,000 (1977) in years 8, 16, 23

Escalated to Oct. 1986
$36,000 X $\frac{2317}{1355}$ = $61,558

10% Discount (2% differential) year 8	.568	
Present Value Capital Cost		$ 34,965
10% Discount (2% differential) year 16	.310	
Present Value Capital Cost		$ 19,082
10% Discount (2% differential) in year 23	.183	
Present Value Capital Cost		$ 11,265

Total Present Value Capital Costs - Cherry Point $428,981

b. Existing Boiler Plant Replacement/Upgrading Cost

Camp Geiger Capital Cost
$2,000,000 (1982$) in 1989

Escalated to Oct. 1986
$2,000,000 X $\frac{2317}{1880}$ = $2,464,893

10% Discount (2% differential) year 2 .893

Present Value Capital Cost $2,201,150

Air Station Capital Cost
$2,000,000 (1982) in 1996

Escalated to Oct. 1986
$2,000,000 X $\frac{2317}{1880}$ = $2,464,893

10% Discount (2% differential) year 10 .488

Present Value Capital Cost $1,202,867

Total Present Value Replacement Costs $3,404,017

2. Recurring Costs

a. Annual Incremental Landfill Development Cost - Cherry Point

Year	Yr. of Op.	1977$	1987$*	10% Discount (2% differential)	Present Value
1986	1	53,312	91,161	0.963	$ 87,788
	2	54,208	92,694	0.893	82,775
	3	55,104	94,226	0.828	78,019
	4	56,000	95,758	0.768	73,542
	5	56,896	97,290	0.712	69,270
	6	57,792	98,822	0.660	65,223
	7	60,438	103,347	0.612	63,248
	8	61,334	104,879	0.568	59,571
	9	62,230	106,411	0.526	55,972
	10	63,126	107,943	0.488	52,676
	11	64,022	109,475	0.453	49,592
	12	64,918	111,007	0.420	46,623
	13	65,814	112,539	0.389	43,778
	14	66,710	114,071	0.361	41,180
2000	15	67,606	115,604	0.335	38,727
	16	68,502	117,136	0.310	36,312
	17	69,398	118,668	0.288	34,176
	18	70,294	120,200	0.267	32,093
	19	71,190	121,732	0.247	30,068
	20	72,086	123,264	0.229	28,227
	21	72,982	124,796	0.213	26,582
	22	73,878	126,328	0.197	24,887
	23	74,774	127,861	0.183	23,398
	24	75,670	129,393	0.170	21,997
2010	25	76,566	130,924	0.157	20,555
	Total Present Value Development Cost - Cherry Point				$1,186,279

*Escalation from 1977 to 1986 = $\frac{2317}{1355}$ = 1.70996

b. Annual Incremental Landfill Development Cost - Camp Lejeune

Yr.	of Op.	1977$*	1987$*	10% Discount (2% differential)	Present Value
1986	1	$215,809	368,960	.963	$ 355,308
	2	217,609	372,037	.893	332,229
	3	219,157	374,684	.828	310,238
	4	220,956	377,760	.768	290,119
	5	222,505	380,408	.712	270,850
	6	224,304	383,484	.660	253,099
	7	223,732	382,506	.612	234,093
	8	225,532	385,583	.568	219,011
	9	227,331	388,659	.526	204,434
	10	228,879	391,305	.488	190,957
	11	230,679	394,383	.453	178,655
	12	230,107	393,405	.420	165,230
	13	231,906	396,480	.389	154,231
	14	233,706	399,558	.361	144,240
2000	15	233,134	398,580	.335	133,524
	16	234,933	401,656	.310	124,513
	17	236,481	404,302	.288	116,439
	18	238,281	407,379	.267	108,770
	19	240,080	410,455	.247	101,382
	20	241,629	413,103	.229	94,601
	21	243,428	416,179	.213	88,646
	22	242,856	415,201	.197	81,795
	23	244,655	418,277	.183	76,545
	24	246,204	420,925	.170	71,557
2010	25	248,003	424,001	.157	66,568
Total Present Value Development Costs - Camp Lejeune					$4,367,034

* Escalation from 1977 to 1986 = $\frac{2317}{1355}$ = 1.70966

c. Annual Incremental Landfill Maintenance Cost - Cherry Point

Year	Yr. of Op.	1977$*	1986$*	10% Discount (0% differential)	Present Value
1986	1	$ 9,520	$ 16,278	.954	$ 15,530
	2	9,680	16,552	.867	14,350
	3	9,840	16,826	.788	13,258
	4	10,000	17,099	.717	12,260
	5	10,160	17,373	.652	11,327
	6	10,230	17,492	.592	10,355
	7	10,480	17,920	.538	9,641
	8	10,640	18,194	.489	8,896
	9	10,800	18,467	.445	8,218
	10	10,960	18,741	.405	7,590
	11	11,120	19.014	.368	6,997
	12	11,280	19,288	.334	6,442
	13	11,440	19,561	.304	5,946
	14	11,600	19,835	.276	5,474
2000	15	11,760	20,109	.251	5,047
	16	11,920	20,382	.228	4,647
	17	12,080	20,656	.208	4,296
	18	12,240	20,929	.189	3,955
	19	12,400	21,203	.172	3,647
	20	12,560	21,477	.156	3,350
	21	12,720	21,750	.142	3,088
	22	12,880	22,024	.129	2,841
	23	13,040	22,297	.117	2,608
	24	13,200	22,571	.107	2,415
2010	25	13,360	22,845	.097	2,215

Total Present Value Maintenance Costs - Cherry Point $174,393

* Escalation from 1977 to 1986 = $\frac{2317}{1355} = 1.70966$

d. Annual Incremental Landfill Maintenance Cost - Camp Lejeune

	Yr. of Op.	1977$*	1986$*	10% Discount (0% differential)	Present Value
1986	1	$ 16,460	$ 28,145	.954	$ 26,851
	2	16,597	28,380	.867	24,605
	3	16,715	28,582	.788	22,522
	4	16,853	28,818	.717	20,662
	5	16,971	29,019	.652	18,920
	6	17,108	29,254	.592	17,318
	7	17,064	29,178	.538	15,698
	8	17,202	29,414	.489	14,383
	9	17,339	29,649	.445	13,193
	10	17,457	29,850	.405	12,089
	11	17,594	30,085	.368	11,071
	12	17,551	30,011	.334	10,023
	13	17,688	30,211	.304	9,184
	14	17,825	30,480	.276	8,412
2000	15	17,781	30,404	.251	7,631
	16	17,919	30,640	.228	6,986
	17	18,037	30,842	.208	6,415
	18	18,174	31,076	.189	5,873
	19	18,311	31,311	.172	5,385
	20	18,429	31,512	.156	4,916
	21	18,567	31,748	.142	4,508
	22	18,523	31,673	.129	4,085
	23	18,660	31,907	.117	3,733
	24	18,778	32,109	.107	3,435
2010	25	18,915	32,343	.097	3,137

Total Present Value Maintenance Costs - Camp Lejeune $281,035

* Escalation from 1977 to 1986 = $\frac{2317}{1355}$ = 1.70966

e. Annual Incremental Cost of #6 Fuel Oil at Camp Geiger and Air Station Plants

av. tons/day trash burned	- 24 hours/day	= tons/hr trash
tons/hr trash	X 5830 lb. steam/ton trash	= equivalent lbs steam/hr*
lbs steam/hr	X 1254 Btu/lb**	= MMBtu/hr
MMBtu/hr	X $12.99/MMBtu***	= $/hr
$/hr	X 8760 hrs/yr	= $/yr
$/yr	X discount factor	= present value

	Year	tons/day	tons/hr.	lbs steam/hr.	Displaced Oil Input MMBtu/hr.	$/hr.	$/yr.	10% Discount (8% differential)	Present Value
1986	1	128	5.33	31,093	38.99	$ 444.87	$3,893,697	.991	$3,858,654
	2	129	5.38	31,336	39.30	448.02	3,924,655	.973	3,818,689
	3	131	5.46	31,822	39.90	454.86	3,984,573	.955	3,805,267
	4	132	5.50	32,065	40.21	458.40	4,015,531	.938	3,766,568
1990	5	134	5.58	32,551	40.82	465.35	4,076,448	.921	3,754,409
	6	135	5.62	32,794	41.12	468.77	4,106,407	.904	3,712,192
	7	136	5.67	33,037	41.43	472.30	4,137,365	.888	3,673.980
	8	137	5.71	33,280	41.73	475.72	4,167,324	.871	3,629,739
	9	138	5.75	33,522	42.04	479.26	4,198,282	.856	3,593,729
	10	140	5.83	34,008	42.65	486.21	4,259,199	.840	3,577,727
	11	141	5.88	34,251	42.95	489.63	4,289,158	.825	3,538,556
	12	142	5.92	34,494	43.26	493.16	4,320,116	.810	3,499,294
	13	143	5.96	34,737	43.56	496.58	4,350,075	.795	3,458,310
	14	144	6.00	34,980	43.86	500.00	4,380,035	.781	3,420,807
2000	15	145	6.04	35,223	44.17	503.54	4,410,992	.766	3,378,820
	16	146	6.08	35,466	44.47	506.96	4,440,952	.752	3,339,595
	17	148	6.17	35,952	45.08	513.91	4,501,869	.739	3,326,881
	18	149	6.21	36,194	45.39	517.46	4,532,826	.725	3,286,299
	19	150	6.25	36,438	45.69	520.87	4,562,786	.712	3,248,703
	20	152	6.33	36,923	46.30	527.82	4,623,703	.699	3,231,968
	21	153	6.38	37,166	46.61	531.35	4,654,661	.687	3,197,752
	22	154	6.42	37,409	46.91	534.77	4,684,620	.674	3,157,434
	23	155	6.46	37,652	47.22	538.30	4,715,578	.662	3,121,712
	24	157	6.54	38,138	47.82	545.15	4,775,496	.650	3,104,072
2010	25	158	6.58	38,381	48.13	548.68	4,806,454	.638	3,066,517
						Total Present Value Fuel Oil Cost			$86,567,674

* Includes blowdown and feedwater heating

** Includes Camp Geiger Plant Efficiency

*** $5.92 (Jan. 82) escalated to Oct. 87

Fy82	Fy83	Fy84	Fy85	Fy86	
$5.92 X	1.14 X	1.14 X	1.14 X	1.14 X	1.14 = 11.40

021882

Summary Sheet Alternative 2B - Total Present Value

Investment Costs	
Cherry Point Capital Costs	$ 428,981
Boiler Plant Replacement Cost	3,404,017
Recurring Costs	
Cherry Point Development	1,186,279
Camp Lejeune Development	4,367,034
Cherry Point Maintenance	174,393
Camp Lejeune Maintenance	281,035
Fuel Oil	$86,567,674
Total Present Value Alternative 2B	96,409,413
Discount Factor 9.524	
Uniform Annual Cost	10,122,785

REQUEST FOR PROJECT SITE APPROVAL
NAVMC 11069 (11-80)
U1 PADS OF 50

PROJECT NUMBER	ACTIVITY UIC
P-822	67001

TO COMMANDANT OF THE MARINE CORPS (CODE LFF-1) (4700

SECTION A
FOR USE BY REQUESTER

FROM
MARINE CORPS BASE, CAMP LEJEUNE, NORTH CAROLINA 28542

CATEGORY CODE AND PROJECT TITLE	TYPE OF FUNDING	COST ($000)	PROGRAM YEAR
821-09 - FACILITY ENERGY IMPROVEMENTS	MCON	23,000	FY-86

PROJECT DESCRIPTION
Provide a Co-Generation Plant capable of burning solid waste & producing 30,200 lbs/hour of steam & 725KW of electricity during the initial year.

REMARKS
This is an FY-86 Energy Conservation Investment Program (ECIP) project.

TYPE OF MAP	DATE
Site Location (encl 1)	-

REQUESTED BY (Typed name and signature)
R. E. CARLSON, CDR, CEC, USN
PUBLIC WORKS OFFICER

DATE
7 JAN 1983

SECTION B
HQMC REVIEW AND ANALYSIS

ANALYSIS
(Place a check (✓) in box opposite each item Y = Yes; N = No; NA = Not Applicable)

DATE RECEIVED

Y	N	NA	PROJECT SITING CONSIDERATION
			a. COMPATIBLE WITH ACTIVITY PLANNED DEVELOPMENT GOALS
			b. DEMONSTRATES SOUND PLANNING PRINCIPLES
			c. MEETS MINIMUM PLANNING AND SITING CRITERIA

Y	N	NA	PROJECT SITING CONSIDERATION
			c. COMPLIES WITH THE FOLLOWING CRITERIA
			(1) AMMUNITION AND EXPLOSIVES
			(2) ELECTROMAGNETIC RADIATION
			(3) AIRFIELD SAFETY
			(4) NOISE INTENSITY
			(5) FIRE PROTECTION

COMPATIBLE WITH ACTIVITY MASTER PLAN (Check appropriate box)
- ☐ IDENTICAL
- ☐ DIFFERENT BUT CONSISTENT
- ☐ NOT SHOWN BUT CONSISTENT
- ☐ *NOT SHOWN AND INCONSISTENT
- ☐ *DIFFERENT AND INCONSISTENT

CRITERIA CERTIFICATION(S) REQUESTED (Check)
☐ DDESB ☐ CNO ☐ NAVSEA ☐ NAVELEX ☐ NAVAIR ☐ OTHER

DATE

DATE CERTIFICATION(S) RECEIVED

DDESB	CNO	NAVSEA	NAVELEX	NAVAIR	OTHER

ACTION
☐ APPROVED ☐ DISAPPROVED ☐ DEFERRED

REMARKS

APPROVING OFFICIAL (Typed name and signature)

DATE

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE

WASHINGTON, D. C. 20301

21 OCT 1977

MANPOWER,
RESERVE AFFAIRS
AND LOGISTICS

MEMORANDUM FOR ASSISTANT SECRETARY OF THE ARMY (IL&FM)
ASSISTANT SECRETARY OF THE NAVY (MRA&L)
ASSISTANT SECRETARY OF THE AIR FORCE (MRA&I)
DIRECTOR, DEFENSE LOGISTICS AGENCY
DIRECTOR, DEFENSE MAPPING AGENCY
DIRECTOR, DEFENSE NUCLEAR AGENCY
DIRECTOR, NATIONAL SECURITY AGENCY

SUBJECT: Energy Conservation Investment Program (ECIP) Guidance

Reference: Deputy Assistant Secretary of Defense (I&H) memorandum dated March 24, 1977, subject as above.

This memorandum supersedes the referenced one. The enclosure constitutes new guidance for the FY 79-84 ECIP program resulting from the recent Secretary of Defense Program Decision Memoranda and the requirements of Executive Order 12003, "Relating to Energy Policy and Conservation."

Perry J. Fliakas
Deputy Assistant Secretary of Defense
(Installations and Housing)

Enclosure

ENERGY CONSERVATION INVESTMENT PROGRAM (ECIP) GUIDANCE

1. PURPOSE

The ECIP is a Military Construction (MILCON) funded program for retrofitting existing DoD facilities to make them more energy efficient while providing substantial savings in utility costs. It is an integral part of the DoD Energy Conservation Program and is designed to achieve a major portion of DoD energy conservation goals for existing facilities as required by Executive Order 12003.

2. CRITERIA

a. All projects must be cost effective; i.e., must amortize within within their economic life. (See Para. 6)

b. All projects must produce an Energy to Cost ratio (E/C) of MBTU's of energy saved yearly per thousand dollars (K$) of current working estimate (CWE) investment equal to or greater than the minimum values for each program year listed below, viz,

$$E/C = \frac{\text{MBTU Saved/Yr.}}{\text{K\$ CWE}} \geq \text{the minimum values listed below.}$$

Additionally, to meet the required reduction in facility energy use, major participants will attempt to achieve at least the average E/C ratios listed in column 3 below for each year's total program.

FY	Minimum E/C Ratio	Average E/C Ratio
79	23	58
80	22	49
81	20	41
82	19	36
83	18	32
84	17	30

Where the average amount is exceeded, a commensurate reduction in the next year's ratio may be taken, and conversely, where not achieved, the next year's ration will be increased. Since these average goals were established by an extrapolation of the FY 76-78 ECIP program, they may not be attainable; however, they do provide a means of determining how closely the program, as executed, meets the plan projections and thus provide the means for adjusting the plan in future years.

c. To the extent that projects have been identified and analyzed in advance, projects will be prioritized in annual budget submissions based on the E/C ratio of energy saved yearly per investment cost. If two or more projects have about the same ratio, these projects will then be ranked on the basis of their benefit/cost ratios. The intent is to do those projects with the greatest energy savings per investment cost in the earlier years of the ECIP, and recognizes that not all projects will have been identified in the nearer time frame. If a project has a very high benefit/cost ratio but the E/C ratio is too low to qualify for that year's budget submission, it may be included provided it meets the minimum E/C requirements of paragraph 2b and the average of all projects will still meet the average E/C ratio.

3. OCONUS PROJECTS

OCUNUS projects may be included only if they effect savings of U.S. energy sources in FY 79 and FY 80. Therefore, at least 20% of the fuel to be saved must be derived from U.S. refined projects. For FY 81 and beyond, this restriction is removed, but OCONUS projects are limited to 10% of the Agency program for each year.

4. NATURAL GAS POLICY

DoD policy requires replacing natural gas heating systems with coal or fuel oil systems where possible except for individual boilers or warm-air furnaces less than five Mega Btu per hour output. Current natural gas heating systems, except as noted above, will be evaluated for energy cost saving on the basis of equivalent fuel oil or coal prices and fuel oil or coal escalation.

5. ENERGY CONVERSIONS

a. For purposes of calculating energy savings, the following conversion factors will be used.

Purchased Electric Power	11,600 BTU/kwh
Distillate Fuel Oil	138,700 BTU/gal
Residual Fuel Oil	Use average thermal content of residual fuel oil at each specific location.
Natural Gas	1,031,000 BTU/1000 cu.ft.
LPG, Propane, Butane	95,500 BTU/gal
Bituminous Coal	24,580,000 BTU/Short Ton
Anthracite Coal	28,300,000 BTU/Short Ton
Purchased Steam	1,390 BTU/lb

b. Purchased energy is defined as being generated off-site. For special cases where electric power or steam is purchased from on-site sources, the actual average gross energy input to the generating plant plus distribution losses may be used but in no case shall the power rate be less than 10,000 Btu/kwh or the steam rate be less than 1200 Btu/lb.

c. The term coal does not include lignite. Where lignite is involved, the Bureau of Mines average value for the source field shall be used.

d. Where refuse derived fuel (RDF) is involved, the heat value shall be the average of the RDF being used or proposed.

e. When the average fuel oil heating value is accurately known through laboratory testing for a specific military installation, that value may be used in lieu of the amount specified in paragraph 5a.

f. Full energy credit may be taken for conversion from fossil fuels or electric power to solar, wind, RDF, or geothermal energy less the calculated average yearly standby requirement.

6. ECONOMIC ANALYSIS

Executive Order 12003 and recent legislation require an economic analysis based on present worth techniques to determine a benefit/cost ratio for each project. The benefit/cost ratio must exceed 1.0 for each project submitted. Appendix A presents a method for determining the benefit/cost ratio applicable to most ECIP projects which will satisfy this requirement. Where a project requires a more detailed approach, use DoDI 7041.3, Economic Analysis and Program Evaluation for Resource Management, as a guide. Table 2, Appendix B, provides fuel escalation rates which may be used in determining benefits when better data derived from local conditions and experience is not available. Tabel 3, Appendix B, provides single amount and cumulative uniform series discount factors for a discount rate of 10% and differential escalation rates of 0, 5, 7 and 8%. Non-energy connected monetary savings are also appropriate for inclusion in the economic analysis.

7. SYNERGISM

When two or more projects are programed for the same structure, care must be used in computation of energy savings to insure that projected energy savings are not duplicative.

8. PROJECT MONITORING

Monitoring of at least one project of each category of ECIP projects, to include instrumenting and metering where feasible, will be conducted somewhere in the U.S. to determine that the energy and cost benefits

predicted in the design phase will actually accrue. Since instrumenting and monitoring each project would seriously erode the cost effectiveness of the entire program without producing commensurate benefits, representative monitoring only is required. Project categories are defined in Appendix B, Table 4. Army, Navy, and Air Force will furnish the location where monitoring is, or will be, conducted for each category of projects to the Deputy Assistant Secretary of Defense for Installations and Housing by 30 September 1978.

9. FUNDING

Program amount by year including the increase recently approved by the Secretary of Defense is at Appendix C. The increases result from the 20 July 1977 Executive Order 12003 "Relating to Energy Policy and Conservation" which, interalia, requires Federal Agencies to reduce facility energy consumption by 20% by 1985 compared with that used in 1975. The ECIP plan is designed to furnish 12% of these facility energy savings at the funding levels shown, with the other 8% to accrue from other programs.

10. BUDGET AND POM SUBMISSIONS

a. DD Forms 1391 will include information as to cost and energy savings. Budget submissions to OSD will continue to be submitted in omnibus packages for each Defense Component and Family Housing and will be identified as energy conservation investment projects at various locations. DD 1391's will be accompanied by a line item identification, description, location, CWE, benefit/cost ratio, pay-back period to one decimal point, annual savings in dollars, and MBTU's saved per $1000 of CWE as a minimum regardless of project cost. Projects will be re-evaluated prior to award and the cost variation authority under Section 603 of the current Military Construction Authorization Act applies. POM submissions need only identify total CWE by year in the following categories; Active Service, Family Housing, National Guard, and Reserve.

b. The PDM for the FY 79 POM provides for ECIP Engineering Studies in FY 79,80, and 81 (see Appendix C). These ECIP Engineering Studies are to be programed, budgeted, and funded under the operation and maintenance accounts.

APPENDIX A

ECONOMIC ANALYSIS COMPUTATION

Location: _____ FY _____

Project: _____

Economic Life _____ Yrs. Date Prepared _____ Prepared by: _____

COSTS

1. Non-recurring Initial Capital Costs.
   - a. CWE $ _____
   - b. Design $ _____
   - c. $ _____
   - d. Total $ _____

BENEFITS

2. Recurring Benefit/Cost Differential Other Than Energy
   - a. Annual Labor Decrease (+)/Increase (-) $ _____ /Yr.
   - b. Annual Material Decrease (+)/Increase (-) $ _____ /Yr.
   - c. Other Annual Decrease (+)/Increase (-) $ _____ /Yr.
   - d. Total Costs $ _____ /Yr.
   - e. 10% Discount Factor $ _____
   - f. Discounted Recurring Cost (d x e) $ _____

3. Recurring Energy Benefit/Costs
   - a. Type of Fuel _____
     - (1) Annual Energy Decrease (+)/Increase(-) _____ MBTU
     - (2) Cost per MBTU $ _____ /MBTU
     - (3) Annual Dollar Decrease/Increase ((1) x (2)) $ _____ /Yr.
     - (4) Differential Escalation Rate (___%) Factor _____
     - (5) Discounted Dollar Decrease/Increase (3) x (4) $ _____
   - b. Type of Fuel _____
     - (1) Annual Energy Decrease (+)/Increase (-) _____ MBTU
     - (2) Cost per MBTU $ _____ /MBTU
     - (3) Annual Dollar Decrease/Increase ((1) x (2)) $ _____ /Yr.
     - (4) Differential Escalation Rate (___%) Factor _____
     - (5) Discounted Dollar Decrease/Increase ((3) x (4)) $ _____
   - c. Type of Fuel _____
     - (1) Annual Energy Decrease (+)/Increase (-) _____ MBTU
     - (2) Cost per MBTU $ _____ /MBTU
     - (3) Annual Dollar Decrease/Increase ((1) x (2)) $ _____ /Yr.
     - (4) Differential Escalation Rate (___%) Factor _____
     - (5) Discounted Dollar Decrease/Increase ((3) x (4)) $ _____
   - d. Type of Fuel _____
     - (1) Annual Energy Decrease (+)/Increase (-) _____ MBTU
     - (2) Cost per MBTU $ _____ /MBTU
     - (3) Annual Dollar Decrease/Increase ((1) x (2)) $ _____ /Yr.
     - (4) Differential Escalation Rate (___%) Factor _____
     - (5) Discounted Dollar Decrease/Increase ((3) x (4)) $ _____
   - e. Discounted Energy Benefits (3a(5)+3b(5)+3c(5)+3d(5)) $ _____

4. Total Benefits (Sum 2f + 3e) $ _____

5. Discounted Benefit/Cost Ratio (Line 4 ÷ Line 1d) _____

6. Total Annual Energy Savings (3a(1)+3b(1)+3c(1)+3d(1)) _____ MBTU

7. E/C Ratio (Line 6 ÷ Line 1a/1000) _____

8. Annual $ Savings (2d+3a(3)+3b(3)+3c(3)+3d(3)) $ _____

9. Pay-back Period ((Line 1a - Salvage) ÷ Line 8 _____ Yr

General. The form on page A-1 may be used for determining Benefit/Cost ratios for most projects. In using this form, the cost of construction is the escalated price of construction at the end of the year programed for funding. Similarly the incremental maintenance and repair costs and the cost of energy/fuels are the costs escalated as above for these services and materials. Design costs are escalated to the project year minus one. For a very few projects this simplified method may not be applicable. An example of when this method is not applicable is when a one-time benefit or cost occurs in years after construction is complete; e.g., a major component replacement is required during the economic life of the RETROFIT project or when a one-time benefit is claimed during the economic life of the project such as salvage value at the end of the economic life. If this occurs, or at the option of the analyst, use DODI 7041.3 as a guide for the economic analysis. In practice this will seldom occur because the major component replacement is usually annualized as part of the recurring maintenance and repair costs and credit for salvage value at the end of economic life is usually disregarded because of an unknown market at 12 to 25 years in the future. An example benefit/cost computation for a typical ECIP project is attached.

b. Title Block: Economic life is the period of time over which the benefits to be gained from a project may reasonably be expected to accrue. As such, the economic life may differ from its physical and technological life. It may further be limited by military or political considerations. The analyst determines economic life based on his knowledge of the factors above, often a difficult task. Therefore, the economic lives listed in Table 1 may be used when in lack of better data. Ordinarily, these values will not be exceeded.

c. Line 1: Non-recurring capital costs include Construction; and Supervision, Inspection, and Overhead (SIOH) which together make up the Current Working Estimate (CWE); final design costs; and other initial one-time costs such as the negative cost for the residual value of existing equipment removed during construction. They do not include energy audit costs, preliminary design, nor analysis costs since these efforts are required by Executive Order, legislation, or DoD requirements whether or not the project is approved and thus become sunk costs. This is the basis for initial justification of a project. After final design is complete, the benefit/cost ratio is usually recomputed based on final design. At that time final design is also considered a sunk cost since funds are expended which cannot be retrieved whether or not the project is advertised. Non-recurring capital costs are escalated as in Para. a, above.

d. Line 2: The recurring benefit/cost differentials other than energy are primarily incremental maintenance and repair costs. Savings are a positive value and costs are a negative value. Attach a work

sheet showing computation of this incremental cost if applicable. Escalate as in Para. a only to end of program year of construction. The discounted present worth factor automatically provides for general inflation during the economic life. Ordinarily no differential escalation factor is applicable to these costs. Thus, use the discount factor from Table 3 for a 10% discount rate with a zero differential escalation rate for line 2e.

e. Line 3: By definition ECIP projects must save energy; thus there will always be an overall energy cost decrement. However, the overall decrement may include increases in use of one fuel and decreases in the use of another. Benefits (decreases) are positive and additional costs (increases) are negative. Attach computations to show calculation of energy savings. Use conversion factors in paragraph 6 of basic guidance to convert to MBTU's. Cost per MBTU is the present unit cost of the energy form escalated to the end of the program year by the short term rates in Table 2. The differential escalation rate is defined as the expected annual escalation resulting from factors unique to the fuel market over and above those experienced by the economy as a whole. The long term differential escalation rates in Table 2 may be used or, where local conditions and experience indicate more valid differential escalation rates, these should be used with the project file indicating the basis for the projection. Differential escalation rate discount factors are taken from the appropriate page of Table 3.

f. Line 5: To be eligible as an ECIP project, the project must have a benefit/cost ratio of greater than one.

Location: For Example FY 80

Project: Install Energy Monitoring and Control System in 141 Buildings

Economic Life 15 Yrs. Date Prepared 2 Oct 77 Prepared by: J. Doe

COSTS	
1. Non-recurring Initial Capital Costs.	
a. CWE	$3 124 660
b. Design	$ 167 654
c. Salvage Value of Existing System	$ - 37 395
d. Total	$3 254 919
BENEFITS	
2. Recurring Benefit/Cost Differential Other Than Energy	
a. Annual Labor Decrease (+)/Increase (-)	$ 35 094/Yr.
b. Annual Material Decrease (+)/Increase (-)	$ 8 471/Yr.
c. Other Annual Decrease (+)/Increase (-)	$ /Yr.
d. Total Costs	$ 43 567/Yr.
e. 10% Discount Factor	$ 7.980
f. Discounted Recurring Cost (d x e)	$ 347 665
3. Recurring Energy Benefit/Costs	
a. Type of Fuel Electricity	
(1) Annual Energy Decrease (+)/Increase(-)	38 077 MBTU
(2) Cost per MBTU	$ 4.04/MBTU
(3) Annual Dollar Decrease/Increase ((1) x (2))	$153831/Yr.
(4) Differential Escalation Rate (7 %) Factor	12.278
(5) Discounted Dollar Decrease/Increase (3) x (4)	$1 888 737
b. Type of Fuel Demand Charge Reduction	
(1) Annual Energy Decrease (+)/Increase (-)	Negl. MBTU
(2) Cost per MBTU	$ /MBTU
(3) Annual Dollar Decrease/Increase ((1) x (2))	$18 731 /Yr.
(4) Differential Escalation Rate (7 %) Factor	12.279
(5) Discounted Dollar Decrease/Increase ((3) x (4))	$ 229 979
c. Type of Fuel Distillate Fuel Oil	
(1) Annual Energy Decrease (+)/Increase (-)	14 078 MBTU
(2) Cost per MBTU	$ 4.50/MBTU
(3) Annual Dollar Decrease/Increase ((1) x (2))	$63 351/Yr.
(4) Differential Escalation Rate (8 %) Factor	13.112
(5) Discounted Dollar Decrease/Increase ((3) x (4))	$830 658
d. Type of Fuel Natural Gas	
(1) Annual Energy Decrease (+)/Increase (-)	9774 MBTU
(2) Cost per MBTU	$ 1.841/MBTU
(3) Annual Dollar Decrease/Increase ((1) x (2))	$179 856/Yr.
(4) Differential Escalation Rate (8 %) Factor	13.112
(5) Discounted Dollar Decrease/Increase ((3) x (4))	$2 358 272
e. Discounted Energy Benefits (3a(5)+3b(5)+3c(5)+3d(5))	$5 307 646
4. Total Benefits (Sum 2f + 3e)	$5 655 311
5. Discounted Benefit/Cost Ratio (Line 4 ÷ Line 1d)	1.74
6. Total Annual Energy Savings (3a(1)+3b(1)+3c(1)+3d(1))	149 907 MBTU
7. E/C Ratio (Line 6 ÷ Line 1a/1000)	48.0
8. Annual $ Savings (2d+3a(3)+3b(3)+3c(3)+3d(3))	$459 336
9. Pay-back Period ((Line 1a - Salvage) ÷ Line 8	6.7 Yr.

ECONOMIC ANALYSIS COMPUTATIONS

1. Non-recurring Initial Capital Costs

Construction	$2,418,000
SIOH @ 5%	120,900
Unescalated CWE	$2,538,900

CWE (Escalated to end FY 80) = $2,538,900 x 1.08 x 1.07 x 1.065
= $3,124,660
(Enter 34,124,660 on Line 1.a.)

Unescalated Design @ 6% of Construction = .06 x 2,418,000 = $145,080

Design (Escalated to end FY 79) = 145,080 x 1.08 x 1.07 = $167,654
(Enter $167,654 on Line 1.b.)

Salvage value of removed equipment (Controls, etc.) = -$30,900

Salvage value (Escalated to end FY 80) = -30,900 x 1.071 x 1064 x 1.062 = -$37,395
(Enter -$37,395 on Line 1.c.)

2. Recurring Benefit(+)/Cost(-) Differenial Other Than Energy.

Labor (Unescalated) -$38,000 + $67,000 = +$29,000/yr

Labor (Escalated to end FY 80) = $29,000 x 1.071 x 1.064 x 1.062
= $35,096/yr
(Enter $35,096 on Line 2.a.)

Materials (Unescalated) -$10,000 + $17,000 = +$7,000/yr

Materials (Escalated to end FY 80) = $7,000 x 1.071 x 1.064 x 1.062
= $8,471/yr
(Enter $8,471/yr on line 2.b.)

3. Recurring Energy Benefits(+)/Costs(-)

a. Electric

$$\text{MBTU Saved} = \frac{\text{KWH Saved x BTU/KWH}}{\text{BTU/MBTU}} = \frac{3,282,459 \times 11,600}{10^6} = 38,077 \text{ MBTU/yr}$$

(Enter 38,077 MBTU/yr on Line 3.a.(1).)

$$\text{\$Cost/MBTU} = \frac{\text{KWH Saved x \$KWH}}{\text{MBTU Saved}} = \frac{3,282,459 \times .03}{38,077} = \$2.59/\text{MBTU}$$

$\$Cost/MBTU (Escalated to end FY 80) = $2.59 x 1.16^3 = $4.04/MBTU
(Enter $4.04 on Line 3.a.(2).)

b. Demand Charge Reduction

MBTU Saved: Negligible

Annual Dollar Saving = $12,000/Yr

Annual Dollar Saving (Escalated to end FY 80) = $12,000 \times 1.16^3 = \$18,731$
(Enter $18,731/Yr on Line 3.b.(3).)

c. Distillate Fuel Oil

$$\text{MBTU Saved} = \frac{\text{Gal. Oil Saved} \times \text{BTU/Gal}}{\text{BTU/MBTU}} = \frac{101,500 \times 138,700}{10^6} = 14,078 \text{ MBTU/Yr}$$

(Enter 14,078 MBTU/Yr on Line 3.c.(1).)

$$\text{\$Cost/MBTU} = \frac{\text{Gal. Oil Saved} \times \text{\$/Gal}}{\text{MBTU Saved}} = \frac{101,500 \times .40}{14,078} = \$2.88/\text{MBTU}$$

$\text{\$Cost/MBTU (Escalated to end FY 80)} = \$2.88 \times 1.16^3 = \$4.50/\text{MBTU}$
(Enter $4.50/MBTU on Line 3.c.(2).)

d. Natural Gas

$$\text{MBTU Saved} = \frac{\text{Cu.Ft. Saved} \times \text{BTU/Cu.Ft.}}{\text{BTU/MBTU}} = \frac{94,809,000 \times 1031}{10^6} = 97,748 \text{ MBTU/Yr}$$

(Enter 97,748 MBTU/Yr on Line 3.d.(1).)

$$\text{\$Cost/MBTU} = \frac{\text{Cu.Ft. Saved} \times \text{\$/Cu.Ft.}}{\text{MBTU Saved}} = \frac{94,809,000 \times .00125}{97,748} = \$1.21/\text{MBTU}$$

$\text{\$Cost/MBTU (Escalated to end FY 80)} = \$1.21 \times 1.15^3 = \$1.84/\text{MBTU}$
(Enter $1.84/MBTU of Line 3.d.(2).)

COMPUTATION OF ENERGY/COST RATIO

CWE (Line 1.a., ECIP Econ. Analysis Summary)	$3,124,660
MBTU Saved/Year (Line 6, ECIP Econ. Analysis Summary)	149,903 MBTU/Yr

Then E/C Ratio is $\frac{\text{MBTU Saved/Yr}}{\text{CWE/1000}} = \frac{149,903}{3,124.660} = 47.97$

Since the Benefit/Cost Ratio in Line 5 is greater than 1.0 and since the E/C ratio computed above is greater than 22.0, the project is an eligible candidate for ECIP funding.

APPENDIX B

TABLES

TABLE 1

MAXIMUM ECONOMIC LIFE

Maximum economic lives are established for the categories of investments listed below even though the equipment or facilities involved may have a physical or technological life of a greater number of years. If in lack of better data, these figures may be used in computing benefit/cost ratios.

Buildings (Insulation, Solar Screens, Heat Recovery System, Solar Installations, etc.)	25 Years
Utilities, Plants, and Utility Distribution Systems	25 Years
Energy Monitoring and Control Systems	15 Years
Controls (Thermostats, Limit Switches, Automatic Ignition Devices, Clocks, Photo Cells, Flow Controls, Temperature Sensors, etc., when these constitute the major end item of the project.)	15 Years
Refrigeration Compressors	15 Years

TABLE 2

ANNUAL ESCALATION RATES

1. Short Term Escalation

Use the escalation rates given below for extending costs and benefits to the program year in paragraphs 1 and 2 of ECIP Economic Analysis Summary, Appendix A, i.e., to the end of the fiscal year in which construction is programed if better local data are not available.

	FY 78	FY 79	FY 80	FY 81	FY 82	FY 83
Design, Construction, SIOH	8.0%	7.0%	6.5%	6.0%	6.0%	6.0%
Maint., & Rpr, O&M, Salvage	7.1%	6.4%	6.2%	5.6%	5.6%	5.6%
Coal	10.0%	10.0%	10.0%	10.0%	10.0%	10.0%
Fuel Oil	16.0%	16.0%	16.0%	14.0%	14.0%	14.0%
Natural Gas & LPG	15.0%	15.0%	15.0%	14.0%	14.0%	14.0%
Electricity and Demand Charge Reduction	16.0%	16.0%	16.0%	13.0%	13.0%	13.0%

2. Long Term Differential Escalation Rates

Use the differential escalation rates given below for computing the present worth of recurring annual costs/benefits in paragraphs 4 and 5 of ECIP Economic Analysis Summary, Appendix A, if better local data are not available.

Maint & Rpr, O&M	0.0%
Coal	5.0%
Fuel Oil	8.0%
Natural Gas & LPG	8.0%
Electricity and Demand Charge Reduction	7.0%

TABLE 3

DIFFERENTIAL ESCALATION DISCOUNT FACTORS

In the Table on the following pages, the one-time cost factors are to be applied to one-time costs occuring in isolated years after the Program year. Recurring benefits/costs factors are to be applied to identical annually recurrent cash flows.

Differential Inflation Rate = 0%*
Discount Rate = 10%

Economic Life Years	One Time Cost Factors	Recurring Benefits/Costs Factors
1	0.954	0.954
2	0.867	1.821
3	0.788	2.609
4	0.717	3.326
5	0.652	3.977
6	0.592	4.570
7	0.538	5.108
8	0.489	5.597
9	0.445	6.042
10	0.405	6.447
11	0.368	6.815
12	0.334	7.149
13	0.304	7.453
14	0.276	7.729
15	0.251	7.980
16	0.228	8.209
17	0.208	8.416
18	0.189	8.605
19	0.172	8.777
20	0.156	8.933
21	0.142	9.074
22	0.129	9.203
23	0.117	9.320
24	0.107	9.427
25	0.097	9.524

* These factors are to be applied to cost elements which are anticipated to escalate at the same rate as the general price level.

Differential Inflation Rate = 5%*
Discount Rate = 10%

Economic Life Years	One Time Cost Factors	Recurring Benefits/Costs Factors
1	0.977	0.977
2	0.933	1.910
3	0.890	2.800
4	0.850	3.650
5	0.811	4.461
6	0.774	5.235
7	0.739	5.974
8	0.706	6.680
9	0.673	7.353
10	0.643	7.996
11	0.614	8.610
12	0.586	9.196
13	0.559	9.755
14	0.534	10.288
15	0.509	10.798
16	0.486	11.284
17	0.464	11.748
18	0.443	12.191
19	0.423	12.614
20	0.404	13.018
21	0.385	13.403
22	0.368	13.771
23	0.351	14.122
24	0.335	14.458
25	0.320	14.777

* These factors are to be applied to cost elements which are anticipated to escalate at the same rate as the general price level.

Differential Inflation Rate = 7%*
Discount Rate = 10%

Economic Life Years	One Time Cost Factors	Recurring Benefits/Costs Factors
1	0.986	0.986
2	0.959	1.946
3	0.933	2.879
4	0.908	3.787
5	0.883	4.670
6	0.859	5.529
7	0.836	6.364
8	0.813	7.177
9	0.791	7.968
10	0.769	8.737
11	0.748	9.485
12	0.728	10.212
13	0.708	10.920
14	0.688	11.608
15	0.670	12.278
16	0.651	12.930
17	0.634	13.563
18	0.616	14.180
19	0.600	14.779
20	0.583	15.363
21	0.567	15.930
22	0.552	16.482
23	0.537	17.019
24	0.522	17.541
25	0.508	18.049

* These factors are to be applied to cost elements which are anticipated to escalate at the same rate as the general price level.

Differential Inflation Rate = 8%*
Discount Rate = 10%

Economic Life Years	One Time Cost Factors	Recurring Benefits/Costs Factors
1	0.991	0.991
2	0.973	1.964
3	0.955	2.919
4	0.938	3.857
5	0.921	4.777
6	0.904	5.681
7	0.888	6.569
8	0.871	7.440
9	0.856	8.296
10	0.840	9.136
11	0.825	9.961
12	0.810	10.770
13	0.795	11.565
14	0.781	12.346
15	0.766	13.112
16	0.752	13.865
17	0.739	14.603
18	0.725	15.329
19	0.712	16.041
20	0.699	16.740
21	0.687	17.427
22	0.674	18.101
23	0.662	18.762
24	0.650	19.412
25	0.638	20.050

* These factors are to be applied to cost elements which are anticipated to escalate at the same rate as the general price level.

TABLE 4

PROJECT CATEGORIES

Project Categories are the major elements of a building system or facility in which energy conservation or energy efficiency actions can be classified.

1. Heating, Ventilating and Air Conditioning (HVAC) - building systems and equipment which create and maintain specified interior temperature and air change conditions.

2. Lighting Systems - building or facility systems that provide artificial light and use more efficient lighting sources, selective controls, timers, and photo electric cells.

3. Electrical Energy Systems - equipment such as solid state rectifiers to replace inefficient motor-generator sets and capacitors for power factor correction to reduce the consumption of electrical energy.

4. Energy Monitoring and Control Systems (EMCS) - specialized equipment designed to monitor interior and exterior environmental conditions and automatically control building operations, or alert personnel to the need for such adjustments, to achieve specified objectives. Known by several other terms, such as utility control systems, such equipment may also provide safety and security monitoring.

5. Weatherization - building design features aimed at achieving maximum energy efficiency for given climatic conditions, including insulation, storm windows and doors, caulking, weatherstripping, etc.

6. Solar - building systems or equipment using the energy of sunlight at the building site to provide part or all of the services necessary, e.g., domestic hot water, space heating and/or cooling.

7. Steam and Condensate Systems - facility central steam distribution system modifications such as installation of condensate return lines, installation of cross connect lines and looped systems to permit plant shut down and sectionalized line shut down during low load summer months as well as modernization and rehabilitation of existing lines including improved insulation and steam flow metering and controls.

8. Boiler Plant Modifications - facility central steam plant modifications such as improved boiler controls, economizers, and the installation of small boilers to facilitate the closing of long deteriorated sections of the central distribution system.

9. Energy Recovery Systems - systems to recover heat or primary energy from processes to be reused to satisfy additional energy requirements.

10. Miscellaneous - any stystem or equipment not classifiable in one of the other categories.

APPENDIX C

ECIP FUNDING

ECIP funding presented here is that approved by Program Decision Memorandum for the FY 79 POM submission. It does not represent budgeted amounts.

ENERGY CONSERVATION INVESTMENT PROGRAM
MILCON FUNDING ($ Millions) 1/

	FY 76	FY 77	FY 78	FY 79	FY 80	FY 81	FY 82	FY 83	FY 84	TOTAL
MY	24.3	73.6	11.3	62.0	70.1	75.2	81.9	88.7	79.3	566.4
tive 2/	24.3	60.1	8.5	57.2	65.1	70.1	76.6	83.3	79.3	524.5
mily Housing	0.0	12.2	0.0	1.0	.9	1.4	1.6	1.7		18.8
serve	0.0	.4	1.5	2.1	2.0	2.0	2.0	2.0		12.0
tional Guard	0.0	.9	1.3	1.7	2.1	1.7	1.7	1.7		11.1
Engineering Studies 3/				(+2.8)	(+3.1)	(+3.3)				
Design 4/				(+3.6)	(+4.2)	(+4.4)	(+4.8)	(+4.3)		
VY	38.9	61.7	29.2	45.3	48.9	52.8	57.0	61.7	18.5	414.0
tive 2/	29.9	52.6	26.1	43.1	47.8	51.8	56.0	60.7	18.5	387.6
mily Housing	7.2	8.0	2.5	1.7	.6	.5	.5	.5		20.4
serve	1.8	1.1	.6	.5	.5	.5	.5	.5		6.0
Engipeering Studies 3/				(+2.0)	(+2.2)	(+2.3)				
Design 4/				(-.5)	(+.5)	(+.8)	(+1.1)	(+1.7)		
R FORCE	62.0	38.9	31.8	42.2	45.5	49.2	53.1	54.0	15.7	392.4
tive 2/	44.0	29.7	31.6	33.1	44.5	48.3	52.2	53.1	15.7	359.7
mily Housing	16.0	7.2	0.2	5.6	1.0	.9	.9	.9		28.7
serve	1.0	1.0		1.0						2.0
tional Guard	1.0	1.0		2.5						2.0
Engineering Studies 3/				(+1.8)	(+2.0)	(+2.2)				
Design 4/				(+2.5)	(+2.6)	(+2.7)	(+3.0)			
FENSE AGENCIES)	0.7	1.9	0.0	3.3	0.5	1.0	0.4	0.1	0.0	7.9
A	.2	.1			0.5	1.0	.4	.1		2.3
Engineering Studies & Design				(+0.1)	(+0.1)					
A		.5		.6						1.1
A	.5									.5
A		1.3		2.7						4.0
TOTAL	125.9	176.1	72.3	152.8	165.0	178.2	192.4	204.5	113.5	1380.7

FY 76-78 amounts as submitted in POM 79. FY 79-83 amounts as submitted in POM 79 plus increases approved by SecDef PDM to meet Executive Order requirements. FY 84 amount outside POM years is consistent with SecDef decision on 12% reduction program.

'Includes the increase in CWE from SecDef PDM which is to be allocated by Component to Active, Family Housing, Rese and National Guard.

'The increase from SecDef PDM for that portion of Engineering Studies appropriate for MILCON Funding. This amount in addition to the CWE total for each Component.

'The increase from SecDef PDM to design the increased construction program for ECIP. This amount is in addition to CWE total for each Component